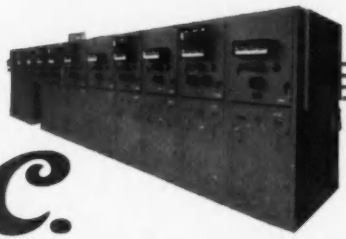
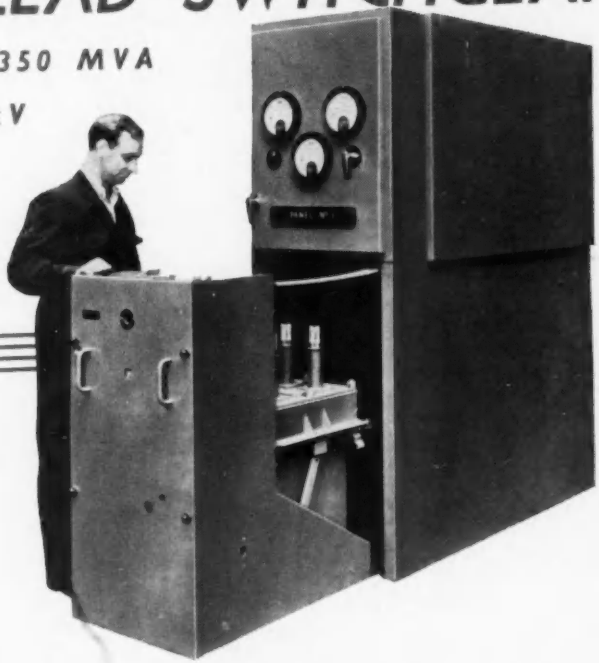
ELECTRICAL TIMES

THURSDAY
31 AUGUST
1950
SIXPENCE



G.E.C.
METALCLAD SWITCHGEAR

150 MVA TO 350 MVA
3·3kV TO 11kV



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Presented free to each buyer of a new Creda Electric Cooker, the lavishly illustrated, four-colour Creda Cookery Book has been, in its own special way, just as big a success as the cooker. Its popularity—it is now being sought as a recognised hand- book on electric cookery—has induced Creda to make a number of copies available for general use. The Creda Cookery Book, which retails at 7/6d, besides being a best seller in its own right, will almost certainly stimulate the sales of electric cookers. Send us your orders right away and turn this splendid opportunity to good account. The free issue with EV12 and EV13 Creda Cookers will, of course, still continue

MADE WITH THE HELP OF Simplex

Simplex Electric Company Limited
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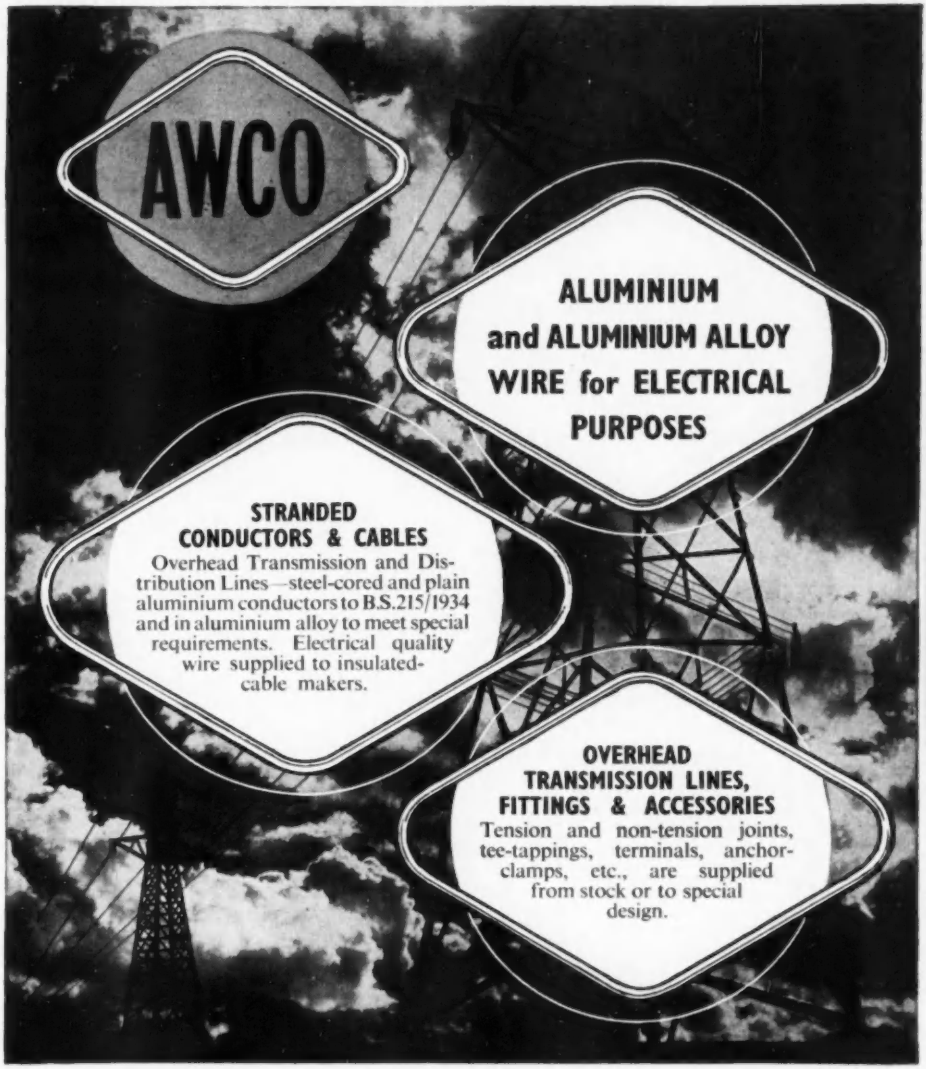
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and ALUMINIUM ALLOY
WIRE for ELECTRICAL
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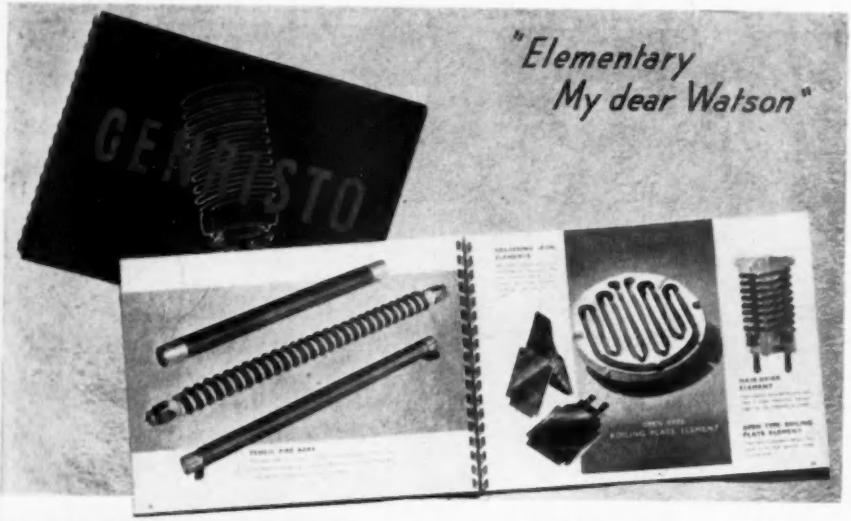

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Even the most highly trained hands are useless unless they are healthy hands—hands that are free from dermatitis.

Where hands have to handle industrial irritants — insulating varnish, shellac, transformer and lubricating oils—Rozalex acts as a barrier against skin troubles. Rozalex, applied very easily and unnoticeable when applied, has raised output in many a factory, not only by eliminating lost time and laid-off workers, but also by eliminating the fear of trouble among the workpeople. There is a type of Rozalex effective against almost every known industrial irritant. Our technical representative is at your service. Write to Rozalex Ltd., 10 Norfolk St., Manchester 2.

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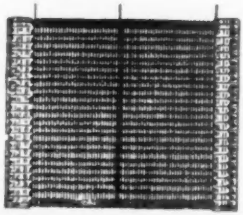

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Registered Trade Name of—
The CRESSALL MANUFACTURING CO., LTD.
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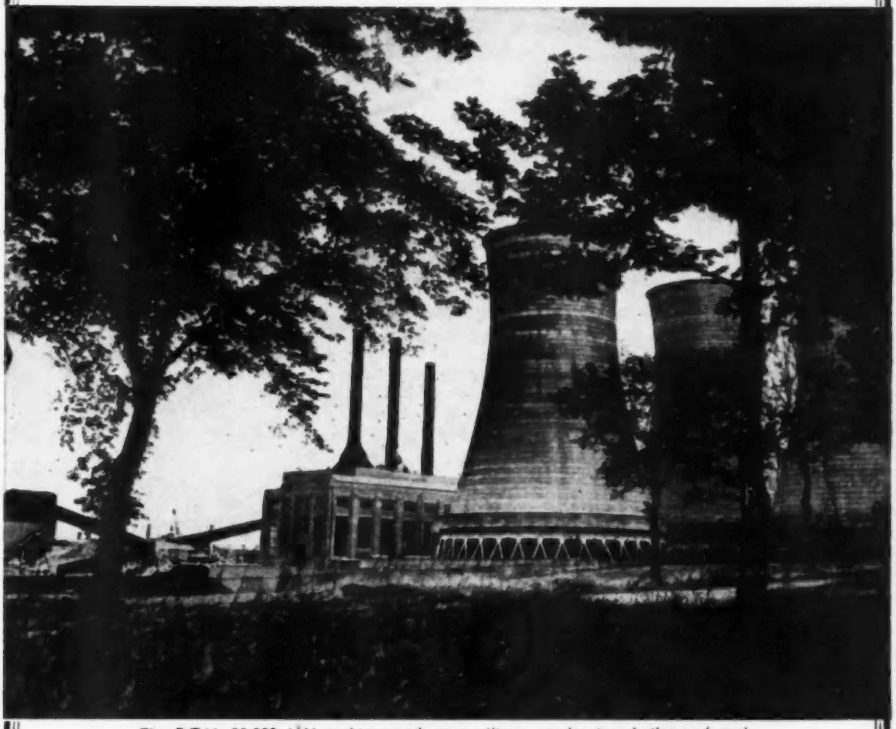

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Walsall Power Station is lubricated with

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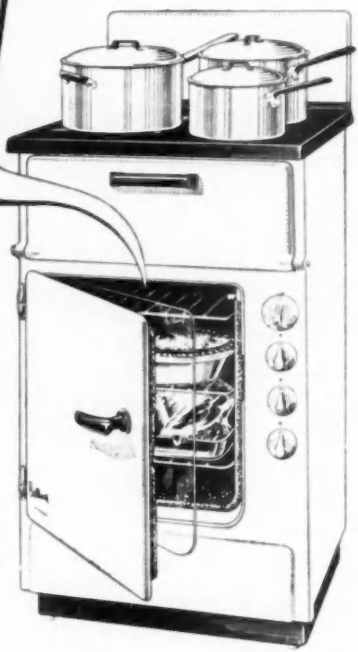

The glass door is just one of the many good selling features of the latest Belling 46/47 cookers—look at these selling points.

- ★ **REALLY LARGE OVEN** with automatic temperature control.
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- ★ **DRAWER** available, removable for cleaning floor space under cooker.
- ★ **BEAUTIFUL ACID-RESISTING FINISH** in white or cream with black vitreous enamel hob.
- ★ **LARGE HOTCUPBOARD** with clear space for plates and food.
- ★ **E.D.A. SPECIFICATION** throughout makes servicing easy.

47AB, 8" and 6½" boiling plates, grill boiler, glass door	£28 . 17 . 6
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46AB, 8" boiling plate, grill boiler, glass door	£26 . 5 . 0
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Drawer 20/-. Cream finish 10/-. Simmerstat 15/6. Radiant Plate 23/6

You can't beat a 'Belling'

BELLING & CO., LTD. · BRIDGE WORKS · ENFIELD · MIDDX.

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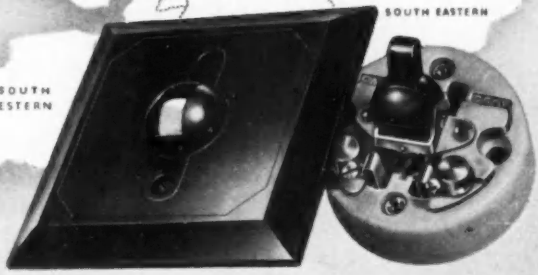
TEMCO Switches

ARE SUITABLE FOR ALL PARTS OF ALL AREAS



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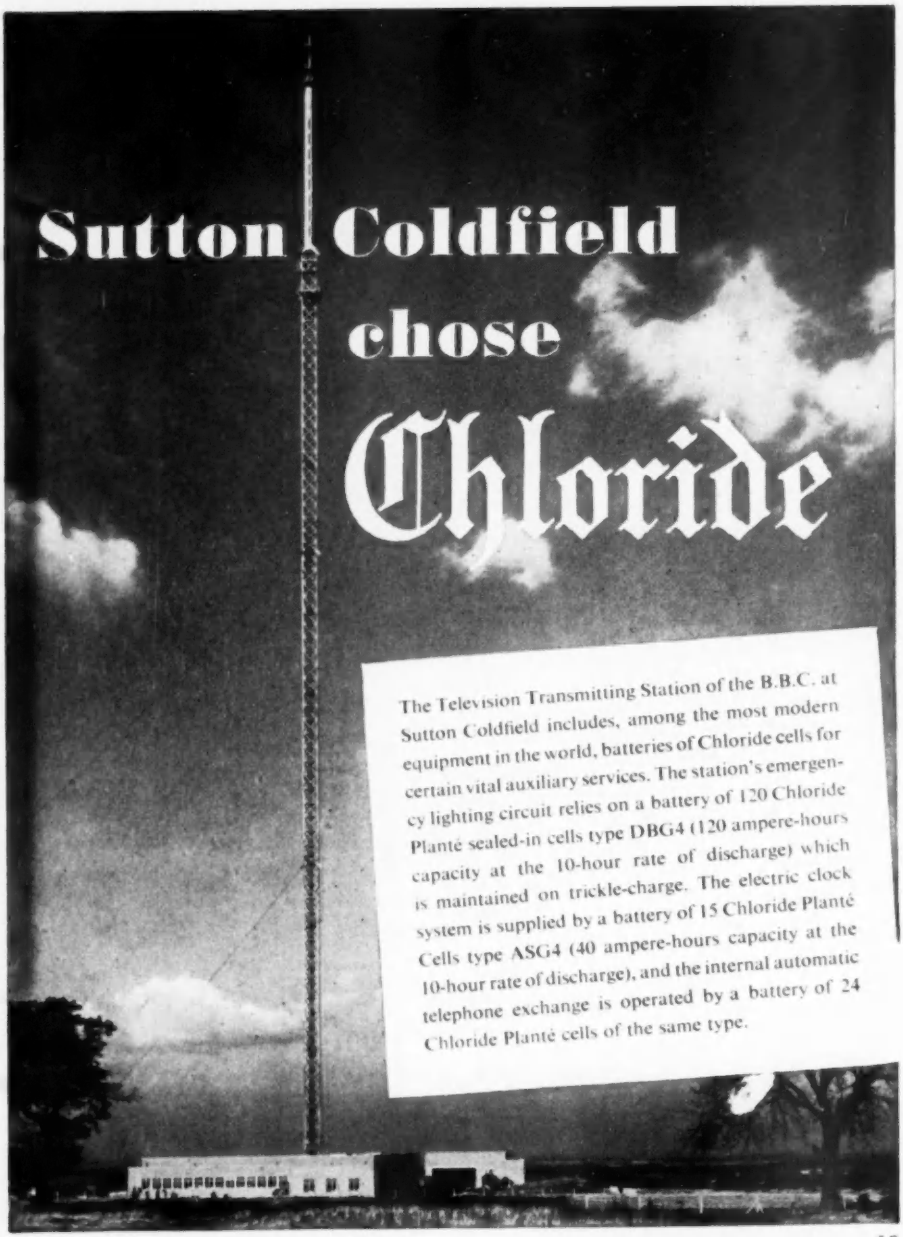
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Chloride
The Television Transmitting Station of the B.B.C. at Sutton Coldfield includes, among the most modern equipment in the world, batteries of Chloride cells for certain vital auxiliary services. The station's emergency lighting circuit relies on a battery of 120 Chloride Planté sealed-in cells type DBG4 (120 ampere-hours capacity at the 10-hour rate of discharge) which is maintained on trickle-charge. The electric clock system is supplied by a battery of 15 Chloride Planté Cells type ASG4 (40 ampere-hours capacity at the 10-hour rate of discharge), and the internal automatic telephone exchange is operated by a battery of 24 Chloride Planté cells of the same type.

S.47

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0.1 sq. in. 3-core screened 33 kV Submarine Cable being installed across Loch Awe by Scottish Cables' Contracts Department for the North of Scotland Hydro-Electric Board. This cable forms part of an important link between Oban and the Glen Shira Hydro-Electric Scheme at Inveraray.

Consulting Engineers:
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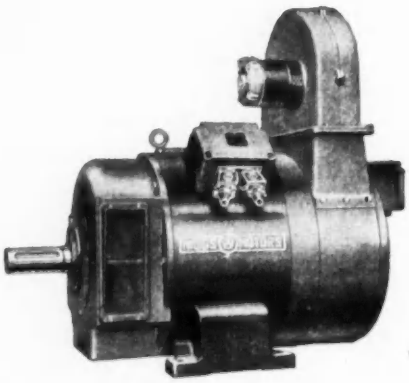

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A three-phase commutator motor designed
to give a wide speed variation by the
simple operation of a handwheel :
Leaflet 45 fully describes these
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from 4 to 30 amps.

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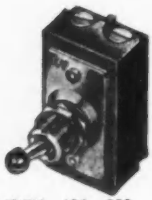
2TFT 10A 250 v. D.P. on and off.



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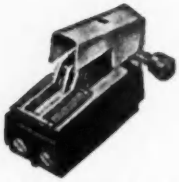
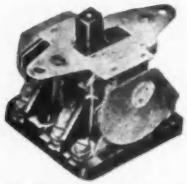
2D.P. 30 A 250 v. D.P. (also in S.P. and S.P. 2 way).



4DPT 10A 250 v. D.P. trigger operated type.

2T 10A 250 v. D.P. Panel mounting, also S.P. 2 way and momentary contact.



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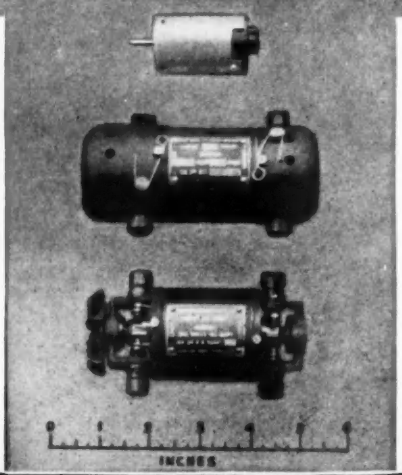

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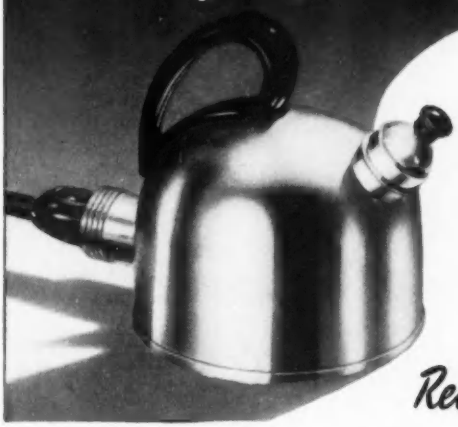

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Chromium Plated Whistling Kettle

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Write NOW for full details of these two new lines for which we confidently forecast a heavy demand!

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For QUALITY • ACCURACY • DEPENDABILITY

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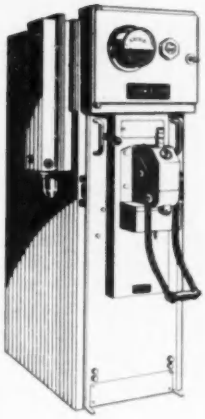
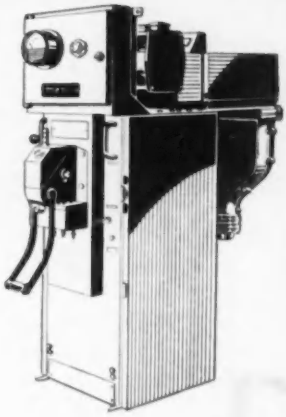


AIR INSULATED—TYPE A.G

A STANDARD METALCLAD UNIT

adaptable for many purposes



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VERTICAL ISOLATION DRAW-OUT PATTERN

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A. S. T. A. CERTIFIED

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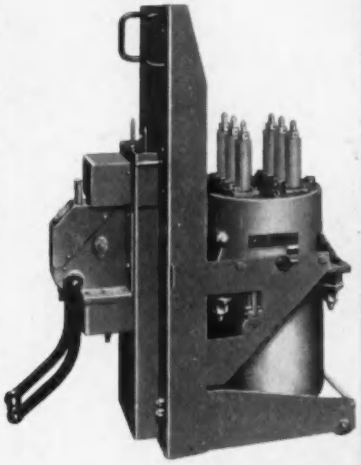

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75 MVA at 3·3 KV

150 MVA at 6·6 KV

150 MVA at 11 KV

250 MVA at 11 KV

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MAXIMUM CURRENT

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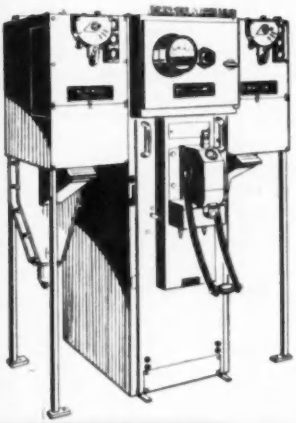

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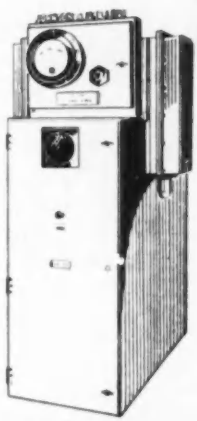
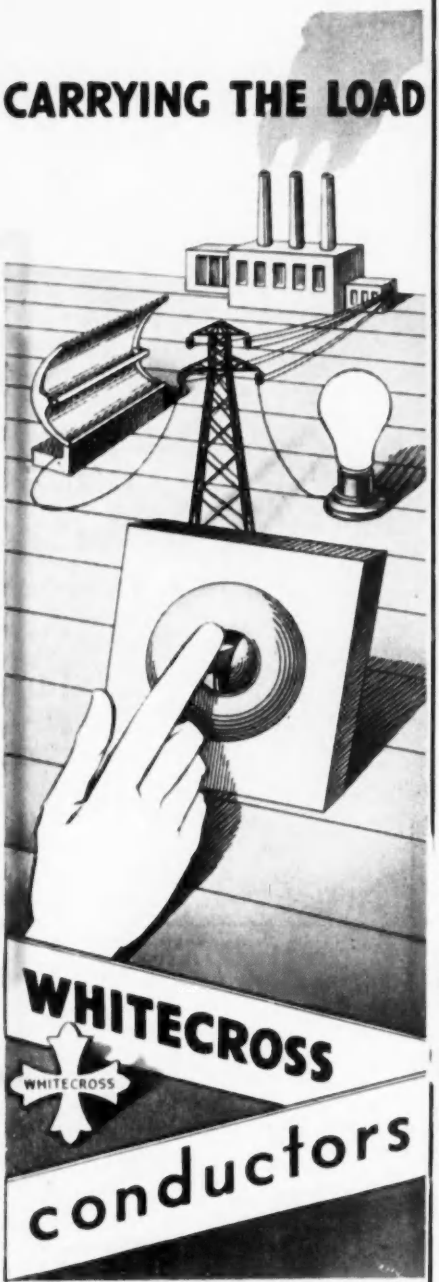


CARRYING THE LOAD



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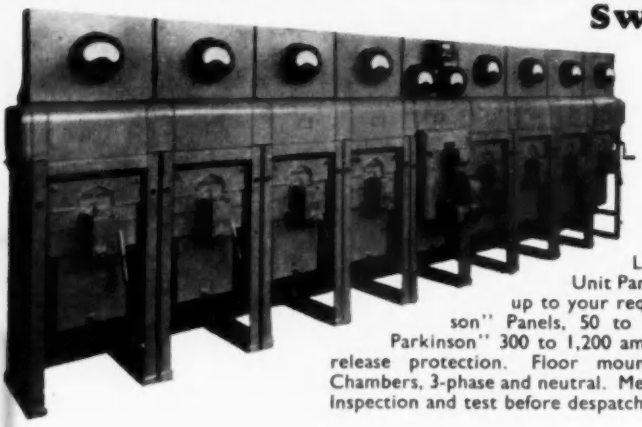

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HEAVY-DUTY METER

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Leather Carrying Case extra if required.

A multi-range A.C./D.C. electrical measuring instrument of specially robust construction designed for outdoor work and where conditions of rough usage exist. The instrument is housed in a strong metal case and the movement has been designed to withstand severe shock without damage.

It is a moving-coil meter and has a knife-edge pointer and a parallax mirror to facilitate accurate reading. The 3½-inch scale is very open and clear, and the meter is accurate to B.S.I. first-grade limits. Current consumption is 1 mA at full scale deflection on D.C. volts and 2 mA on A.C. volts.

The following ranges of readings are available from one pair of terminals, the range selection being effected by means of a single rotary switch :—

VOLTAGE AC/DC
10, 25, 250, 1000 volts.
CURRENT AC/DC
10 mA, 100 mA, 1 amp, 10 amps.
RESISTANCE
0-500 ohms. (Midscale 12.5 ohms)
0-50,000 ohms. (Midscale 1,250 ohms)

Protection from the inadvertent application of electrical overload is provided by an automatic cut-out. The action of the overload mechanism is indicated through an aperture in the scale plate, and a small control on the panel renders the meter again ready for use.

Weight : 5½ lbs. approx.
Size 7⅞ x 5⅞ x 4 inches

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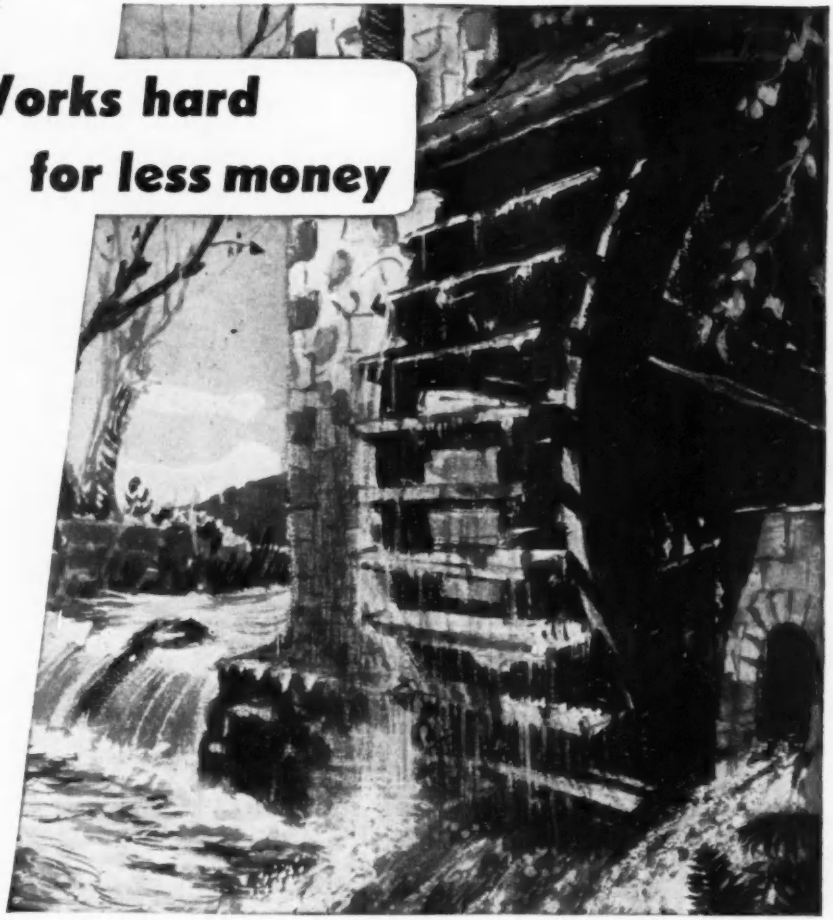

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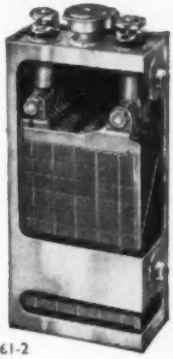

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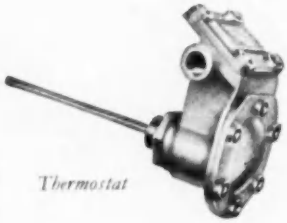
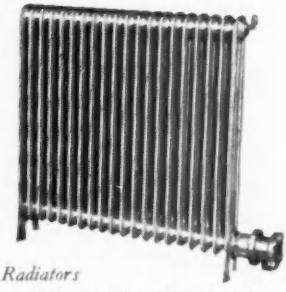


Thermostat



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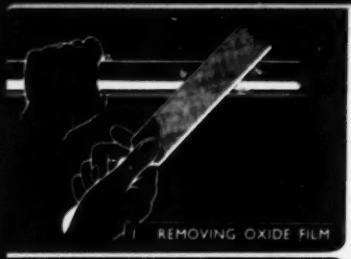

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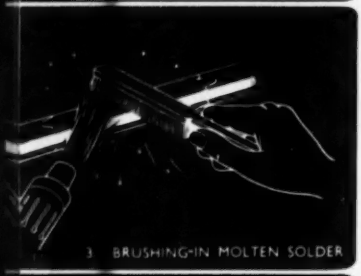

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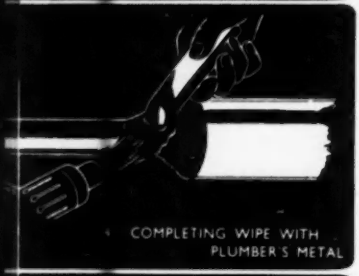
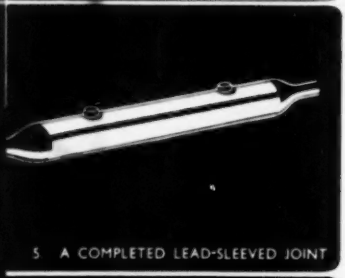


4 COMPLETING WIPE WITH PLUMBER'S METAL



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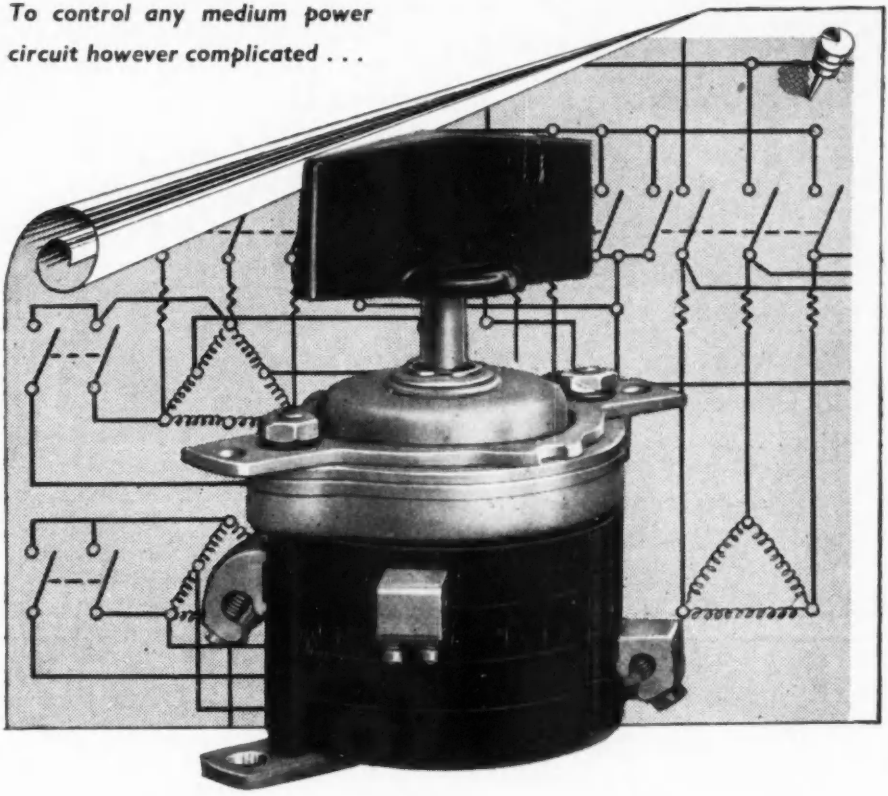

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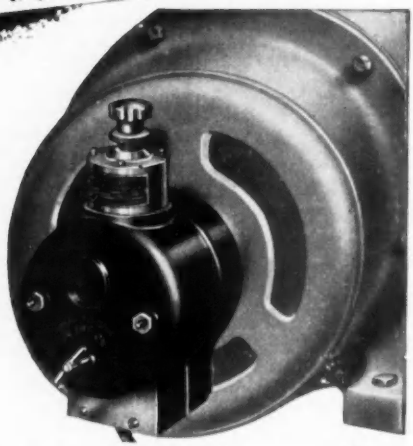

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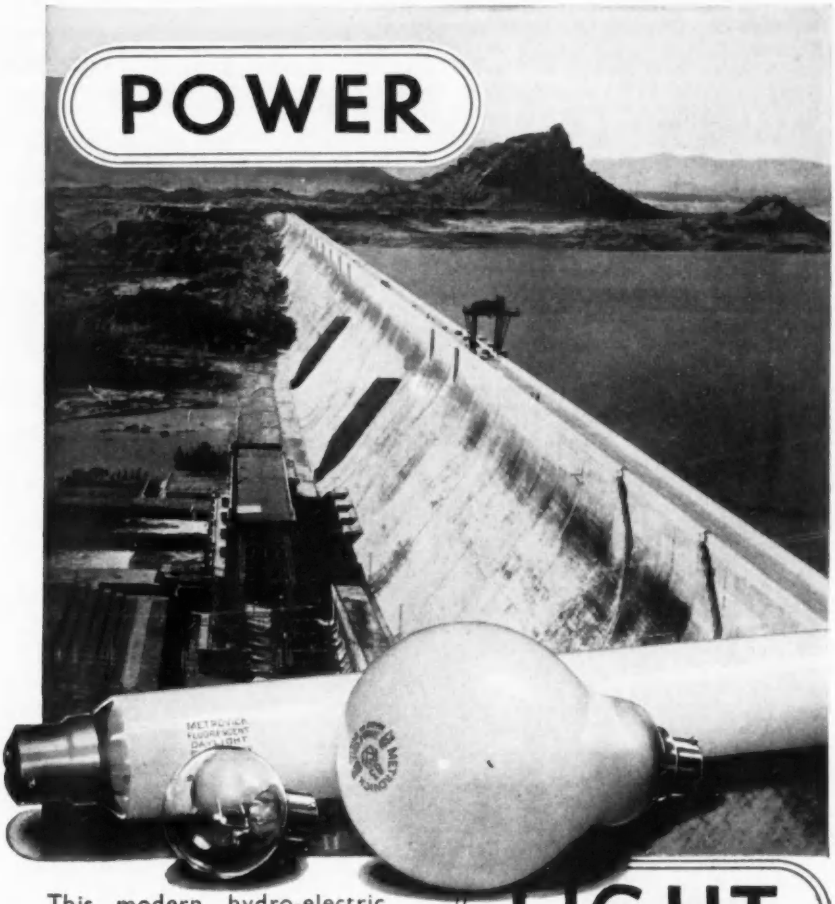

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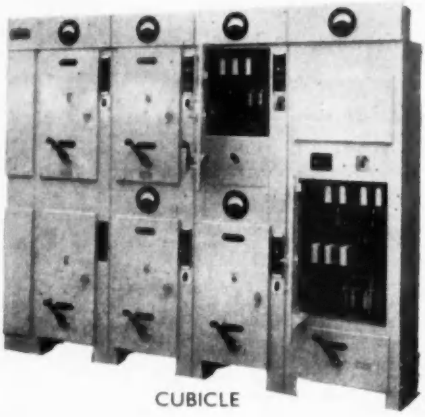

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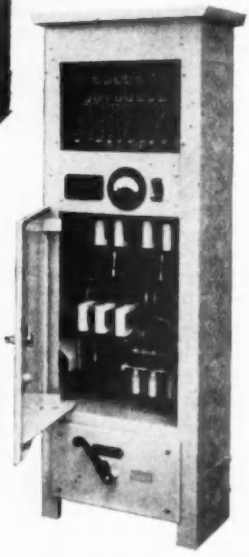

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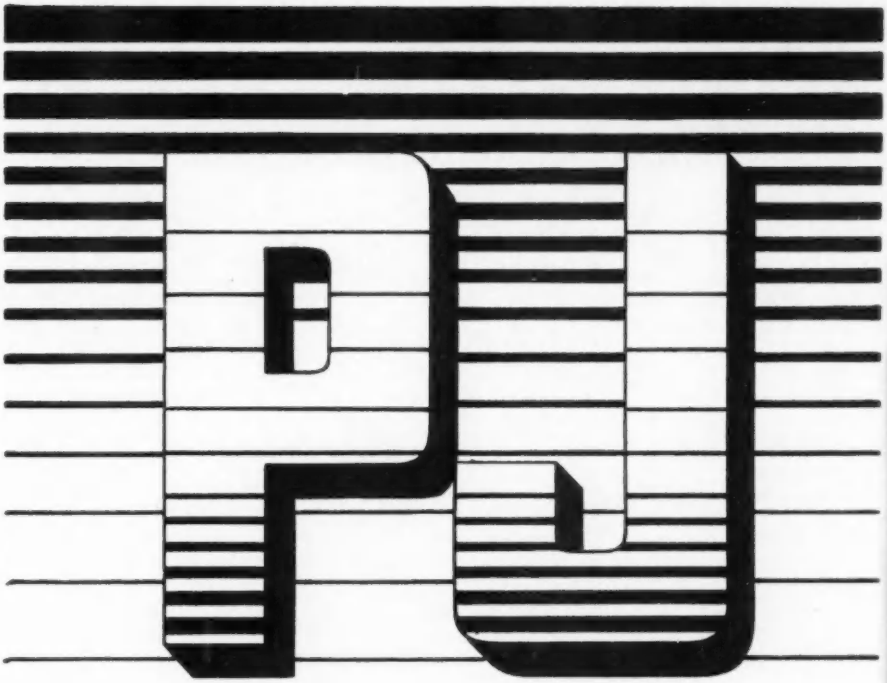

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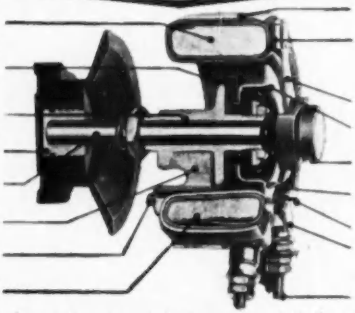

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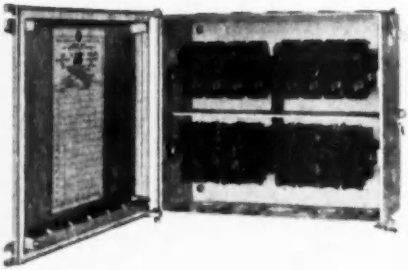

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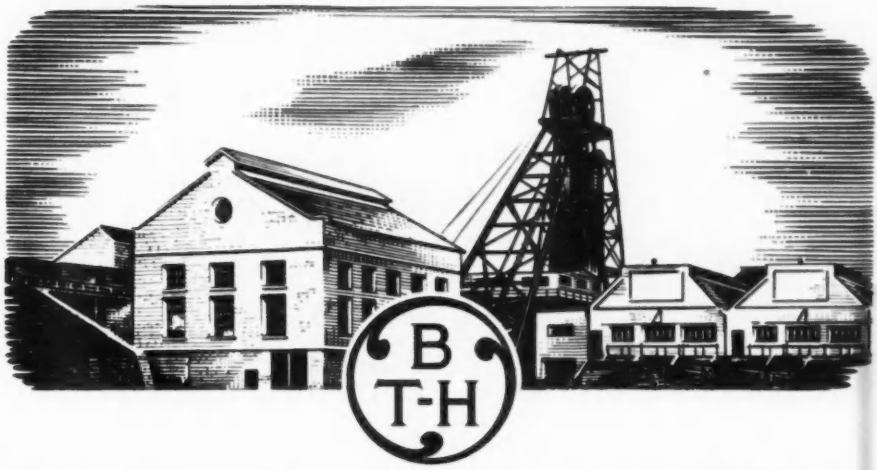

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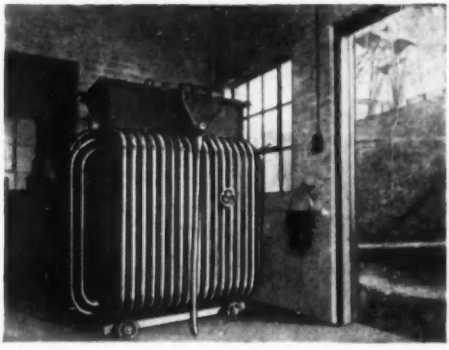

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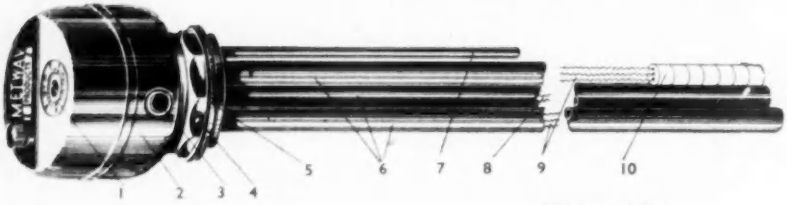

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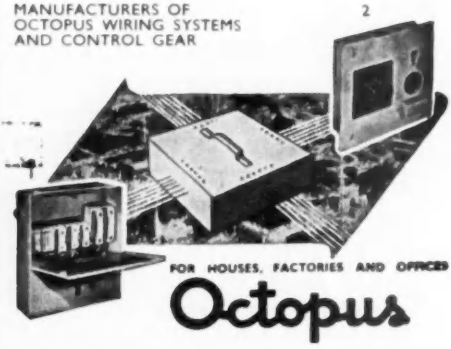

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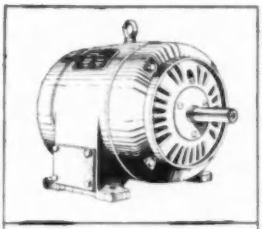

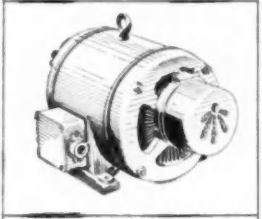

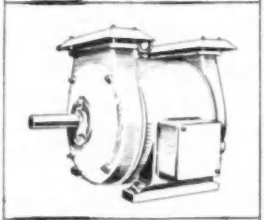

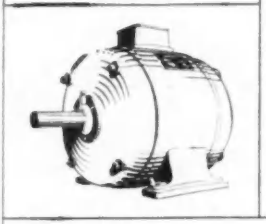

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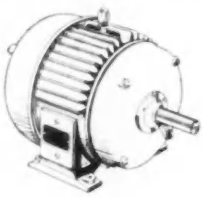

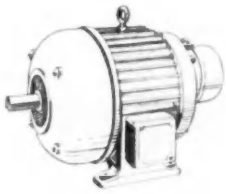

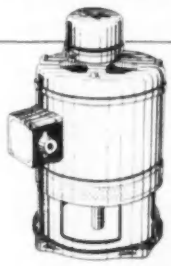

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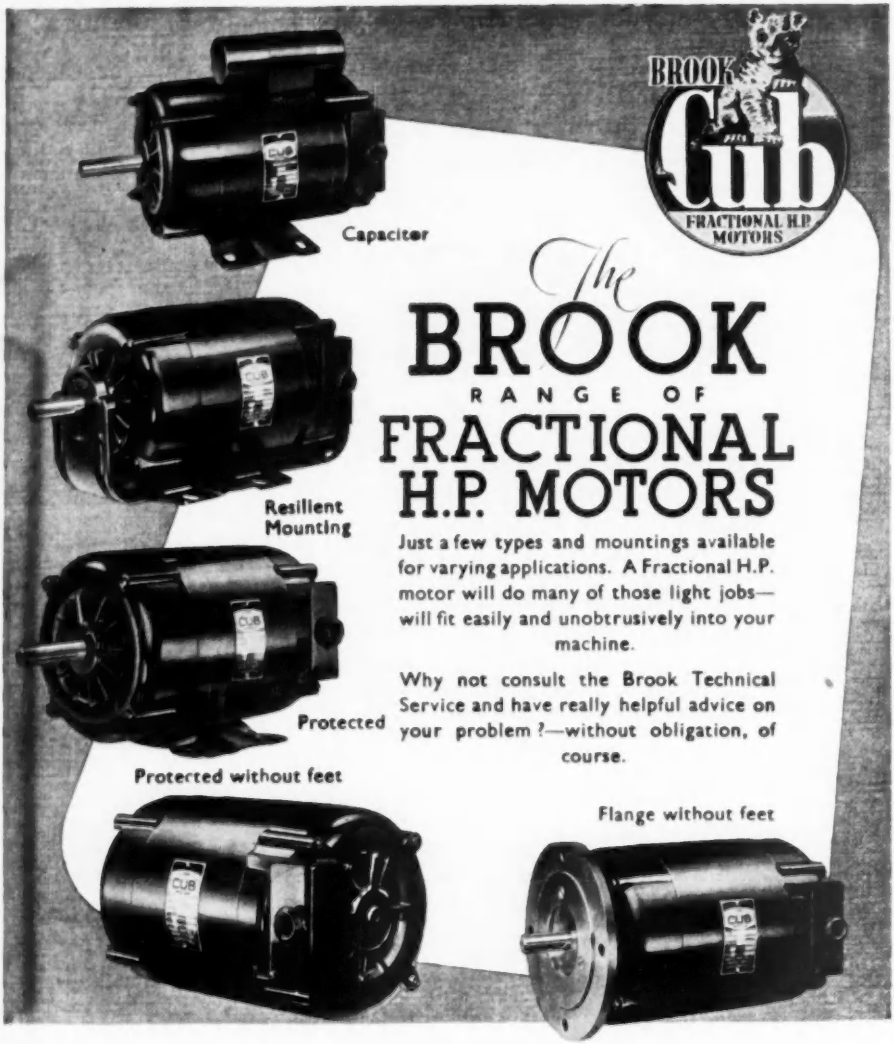

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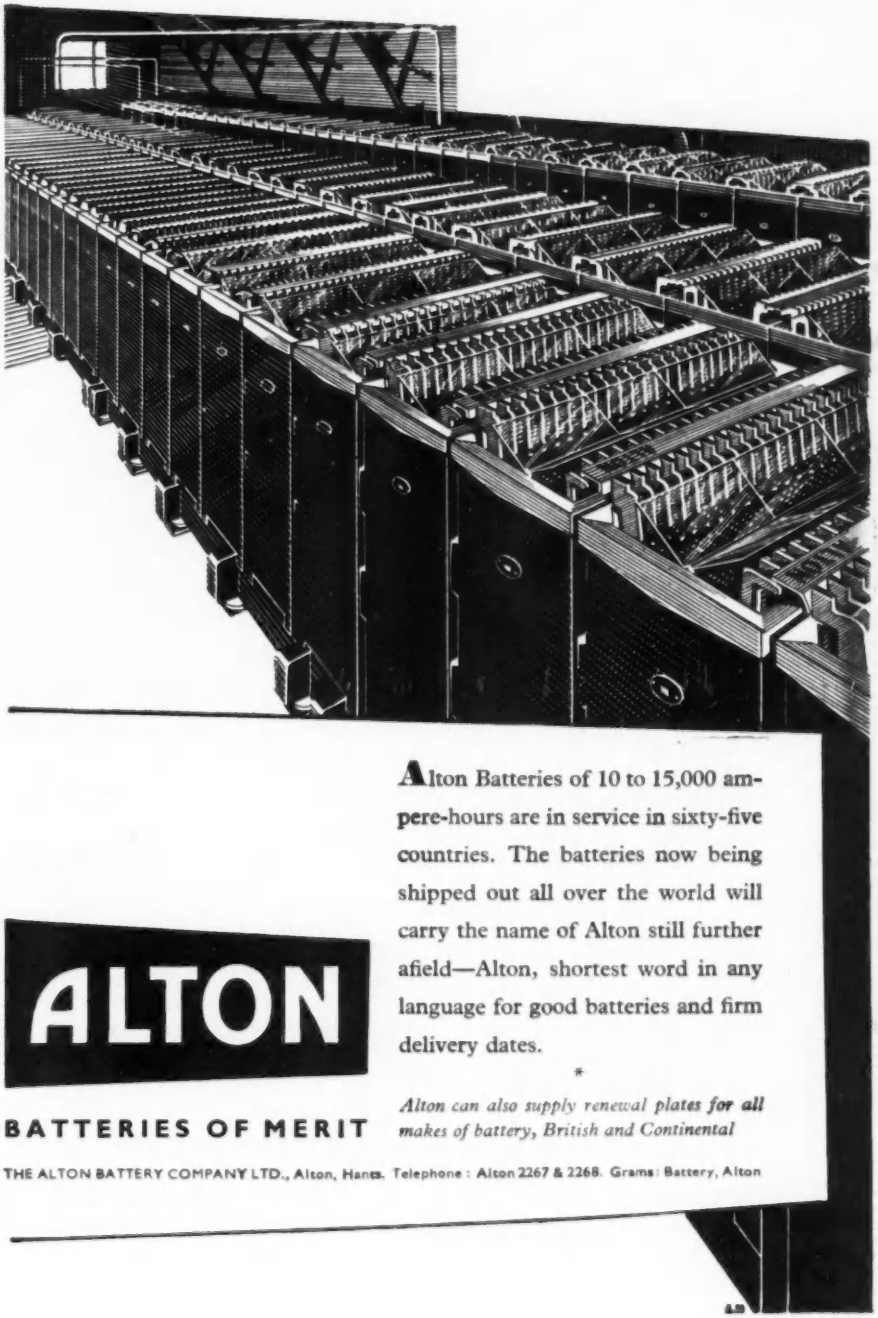

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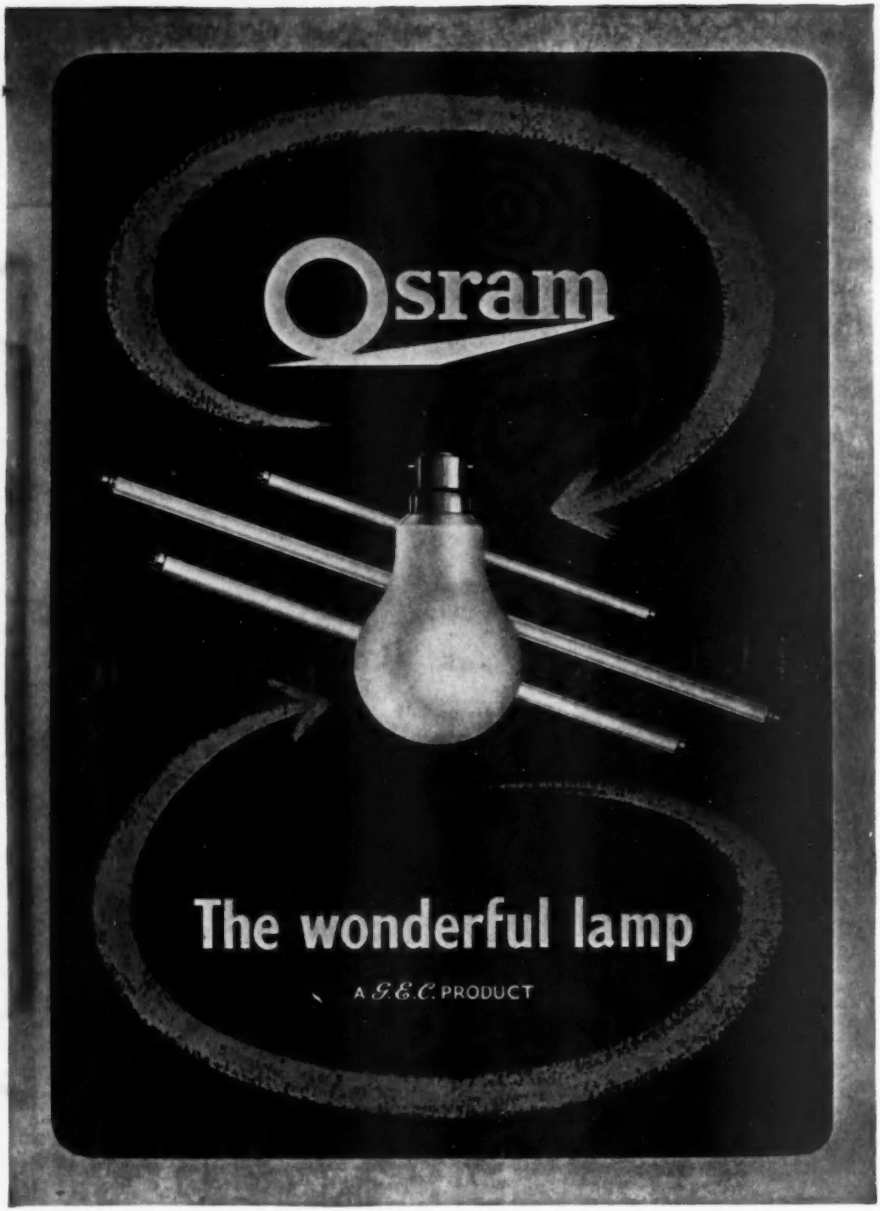

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ELECTRICAL TIMES

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Editorial

SPECIAL SUBJECTS

SUMMER at its height brings forth a sharp reminder of the winter to come, in the closely printed prospectuses of the technical colleges and polytechnics which are so important a part of our educational scheme in this country. In our annual perusal of these lengthy catalogues of educational facilities, we note with extra interest the specialised courses so often included. These lecture series, each a comprehensive discourse by an expert on his particular field, are additional to the general work for the usual certificates and diplomas which set the hallmark on technical studies. A most valuable clarification of ideas results from the overall picture of the subject that is presented, and the man whose main interest lies in another direction, but touches upon the matters discussed, gains useful knowledge economically. In its final effect, such learning results in an increase of efficiency and a saving of manpower, two credit items very welcome in this country today. Our technical teachers, especially heads of departments, show commendable initiative in organising these courses, and both they and the busy engineers and scientists who give up their time to deliver the lectures, deserve industry's thanks and help.

METAL SHORTAGE

ALTHOUGH in his presidential address to the British Association Sir Harold Hartley dealt mainly with fuel and energy problems, one of his most significant remarks had metal availability as its subject, with the limelight focused on the raw materials of the electrical industry. Only for a few decades, apparently, can we still use the familiar components of copper, lead and tin in the quantities at present prevailing. Since the earliest prehistoric applications of copper, we have become accustomed to continuous progression, having always more metals and alloys available for engineering purposes. Now, it seems, we are to be restricted essentially to an iron and light alloy basis. At first sight matters could be worse for the electrical engineer, since iron is spared condemnation and aluminium has many attractive properties both as a conductor and as a cable sheathing. Nevertheless, if Sir Harold's estimate does not prove to be over-pessimistic, designers have a busy time not far ahead of them in gradually adapting their products to secure the most economic construction as the metals now common become increasingly rarer.

COOLING TOWERS

PUBLIC interest in cooling towers, hitherto largely confined to that section of the community which suffered from their alleged unsightliness, or dwelt within the range of their emission, has been stimulated by the exhibition "Energy in the Service of Man," held at Birmingham in conjunction with the British Association meeting. Very little has hitherto been published on the subject and, judging by the Press reports of this exhibition, there seems to be some confusion of thought between the new "dwarf" towers (as one might term them) operating on induced draught, and the research work on existing towers which the B.E.A. itself is undertaking. By courtesy of the company concerned, we are able, elsewhere in this issue, to give a full description of the induced draught tower. Very little information is available regarding the B.E.A.'s own work on existing towers. It is understood that successful results have been obtained, although it is unlikely that any data will be published until further experiments have been undertaken in really adverse weather.

PRICE-CUTTING AGAIN

WITH the general tendency towards hardening of prices, reports of price reductions should be welcome news. When, however, these reductions evolve not from improvements in production, but as a result of price-cutting on the part of middlemen, the situation is entirely different. There are unmistakable signs that the wiring accessories market is suffering in certain parts of the country from the efforts of the price-cutter. Everyone in the industry is well aware that the accessories market, in particular, could not exist without the middleman. One has only to imagine, for example, the manufacturer of bakelite lampholders trying to distribute his output in three-dozen lots to realise that the labourer is worthy of his hire. If the wholesaler is to render the worthwhile services which are expected from firms of repute—as distinct from the "brass-plate" factor, his by no means exorbitant discount is necessary. To cut the price by forgoing a portion of his earnings —either as open discounts or in the form of concealed rebates—benefits no one. In the long run even the buyer will lose, since his supplier can no longer afford to give him either service or reasonable credit. No one, it has been said, is ever ruined by taking small profits. But there are many who have been unable to distinguish a small profit from a small loss and, venturing on price-cutting as a temporary sales stimulant, have found themselves launched on the slippery slope which ends in Carey Street.

ONE HUNDRED—AND ONE

THOSE few miles of water which comprise the English Channel have been much in the news recently, their fame as a test for the physical endeavour of the swimmer being matched by their challenge to the skill of the communications engineer. Last Sunday's successful commercial transmission of television from France to England anticipated by one day the centenary of another notable advance in telecommunications, the successful sending by electric telegraphy of the first message between the two countries. In 1850 telegraphy was the main practical application of the growing science of electrical engineering, and this linking of Britain with a foreign country gave an important impetus to the profession, which was later reinforced by the longer submarine interconnections and the problems which their operation presented for solution. The challenge was successfully accepted by the scientists and engineers of many firms and institutions, and several now famous cable makers were concerned with this early work. It is fitting that Telegraph Construction and Maintenance Ltd., directly connected with the 1850 venture through a founder company, should choose this same occasion to celebrate its own centenary, and that the most recent international connection, between England and Denmark, reviewed in a recent issue, should have been made in their works.

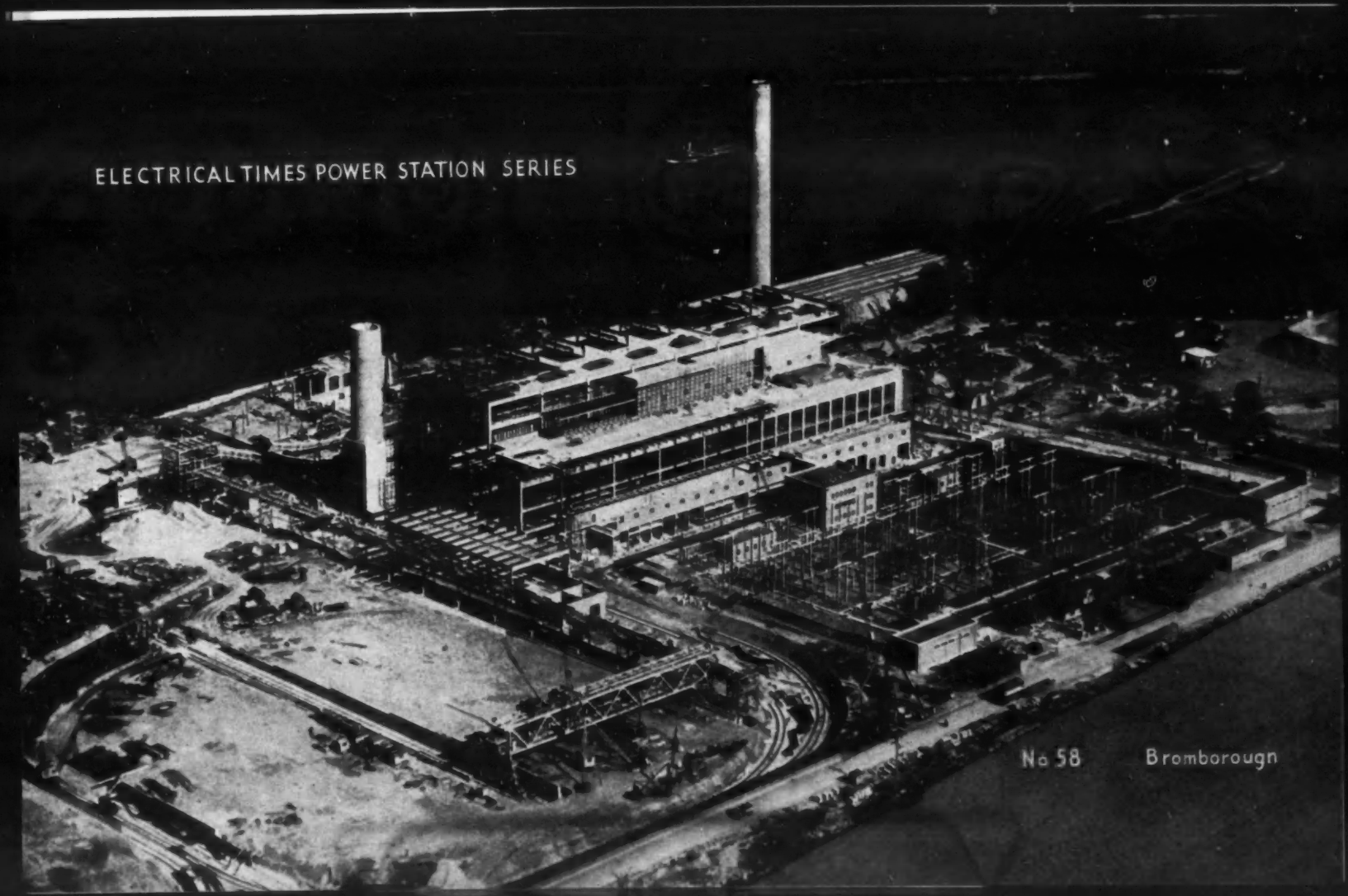
Meteor

THIS WEEK'S PHOTO

BROMBOROUGH power station was first planned by Birkenhead Corporation in 1938 but the war postponed its inception until 1944. Situated on the River Mersey, the site has excellent facilities for cooling water, while rail access to the collieries is good. Ash disposal is carried out at sea by the use of two 700-ton diesel hopper barges. The station comprises four 50 MW English Electric turbines and eight 300 k lb/hr Babcock and Wilcox boilers. Each of the turbines will operate at a pressure of 900 lb/sq in and a temperature of 900° F and will be of the three-cylinder type with dual flow low-pressure cylinder exhausting into twin condensers each with a cooling surface of 48,000 sq ft. There are four stages of feed heating and one evaporator heater per turbine, the final feed temperature being 390° F on full load. Five vertical shaft circulating water pumps each of 37,000 gal/min capacity deliver water from a large silt chamber to a ring main system connected to each condenser. The return water is also on a ring main.

The alternators, which are hydrogen-cooled, generate at 11 kV and are connected direct to transformers stepping up to 132 kV. Each boiler is pulverised fuel fired and rated at 300 k lb/hr, and an economiser, tubular air heater and three mills are provided per boiler. A primary and secondary superheater of the self-draining type is provided and Bailey automatic boiler control is to be installed throughout.

For the removal of coarse ash the Hydrojet system will be employed while dust in the flue gases will be dealt with by means of an electrostatic precipitator, from which it will be removed by the 'Hydrovac' system.


ELECTRICAL TIMES POWER STATION SERIES
No 58 Bromborough

Transmission Calculations

STRAIGHT LINES REPLACE CURVES IN LOAD CHARTS

by K. W. WARDROP,* B.Sc.(Eng.), A.C.G.I.

WHEN considering the transmission of electrical power it is often necessary to know in some detail the performance of the links in the transmission scheme. The main item of interest, and the most difficult to calculate, is the performance of long-distance overhead lines. The limitations which usually occur in such lines are voltage drop, power losses and the electrical displacement angle over the line. Any one or two of these items may be the deciding factor, depending upon the particular case. The usual procedure when dealing with line performance is to base charts upon the transmission vector diagram, such as Evans and Sels charts (see "Transmission Line Charts," J. R. Mortlock, ELECTRICAL TIMES, July 6, 1950). These charts show the voltage drop in the line and the electrical displacement over the line for any given load at a certain receiving or sending end voltage. This article describes a simpler form of chart, involving straight lines rather than large diameter circles, which may offer advantages in some circumstances, where high accuracy is not required. Power and reactive loss and displacement angle charts are also described, together with a tabular method of presenting the information.

The Transmission Line

The circuit constants for any four terminal network are generally represented by **A**, **B**, **C**, and **D**, where

$$E_S = AE_R + BI_R \qquad I_S = CE_R + DI_R$$

and E_S = Sending end voltage, I_S = Sending end current, E_R = Receiving end voltage, I_R = Receiving end current.

For any transmission line these constants are:

$$A = D = \cosh \sqrt{YZ}$$

$$B = \sqrt{Z}\sqrt{Y}\sinh\sqrt{YZ}$$

$$C = \sqrt{Y}\sqrt{Z}\sinh\sqrt{YZ}$$

where **Z** = total impedance of the line and **Y** = total susceptance of the line. As an approximation, if the nominal π method of representation is used, the constants become:

$$A = D = 1 + \tfrac{1}{2}YZ,\ B = Z,\ C = Y\left(1 + \frac{YZ}{4}\right).$$

Now YZ is small compared with unity, so that the transmission vector diagram is basically as shown in Fig. 1. If constant receiving end voltage be assumed, then a power chart can be drawn based on this vector diagram. The power is considered as two components—active power P and reactive power Q, and a simple power chart is shown in Fig. 2 to demonstrate the principle. Constant power and sending end voltage lines are shown, and for any active power P_1 and reactive power Q_1 a sending end voltage of E_{S1} is required. The displacement angle θ can also be shown on the diagram as a series of radial lines drawn from the reference point.

Straight Line Chart

The transmission chart described in the previous section is somewhat difficult to draw, mainly due to the accuracy with which the reference point must be plotted, and the radius of the constant E_S lines being large compared with the size of the chart itself. It was thought therefore, that if a chart could be devised composed of straight lines and presenting virtually the same information, it would offer advantages in ease of construction and reading. Considering the chart shown in

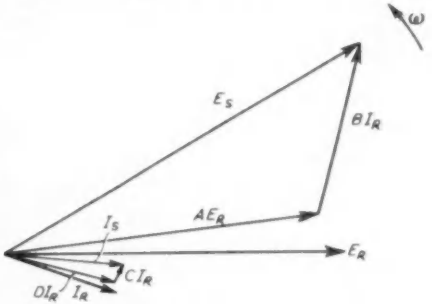


Fig. 1. Vector diagram for a transmission line

*Mr. Wardrop was with Associated Electrical Industries Ltd. when this article was written.

Fig. 2, and in particular E_{S1}, it may be seen that for any constant active power P_1 and variable reactive power Q, E_s is the sum of a constant voltage K_1 (actually E_s for P_1 when $Q=0$) and a voltage which is proportional to Q at constant angle α to K_1, which may be called K_2 Q. So that, for constant power P_1

$$E_s = K_1 + K_2Q$$
$$= K_1 + K_2Q\cos\alpha + jK_2Q\sin\alpha.$$

Now in practice angle α rarely exceeds 45° and K_2Q is rarely greater than a quarter of E_s. Taking these conditions as a limiting case, and letting $K_2Q = 0{\cdot}25K_1$ and $\alpha = 45°$, the equation for E_s becomes

$$E_s = 1 + (0{\cdot}25 \times 0{\cdot}71) + j(0{\cdot}25 \times 0{\cdot}71)$$
$$= 1{\cdot}178 + j0{\cdot}178$$
$$= 1{\cdot}207.$$

Now 1·207 is 2·3% higher than 1·178, so that for practical purposes the j term in the equation for E_s may be ignored as in most cases it will result in an error of somewhat less than 2%. Thus the equation for E_s then becomes

$$E_s = K_1 + K_2Q\cos\alpha$$

which is a linear relationship between E_s and Q. The chart is thus a series of straight lines with the active power as a parameter, and drawn in this instance with Q as abscissae and E_s as ordinate. To draw such a chart K_1, K_2 and α must be calculated for each value of active power considered, as shown later.

Q_s, θ and Power Loss

It is also necessary to know the sending end reactive power, and the active power lost in the line for any given receiving end conditions. The simplest method of achieving these results is to calculate them using a nominal or equivalent π circuit, a task which is simplified

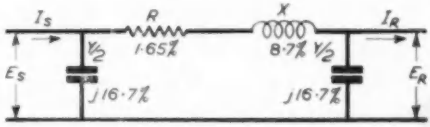


Fig. 3. Nominal π circuit for example considered

if E_s is known. The angle θ may easily be calculated once the angle of E_s for a u.p.f. load is known. If this angle be θ_2 (r.f. Fig. 2) then

$$\theta_1 = \theta_2 - \sin^{-1}\frac{K_2Q\sin\alpha}{E_s}$$

To determine the power loss in the line, the current flowing has to be evaluated and the losses calculated by the I^2R method. The reactive loss is similarly calculated, the reactive power gained from the line being determined from the known voltages and π capacitance.

The calculations described in this section may all be carried out with a slide rule, as differences between large quantities are not involved.

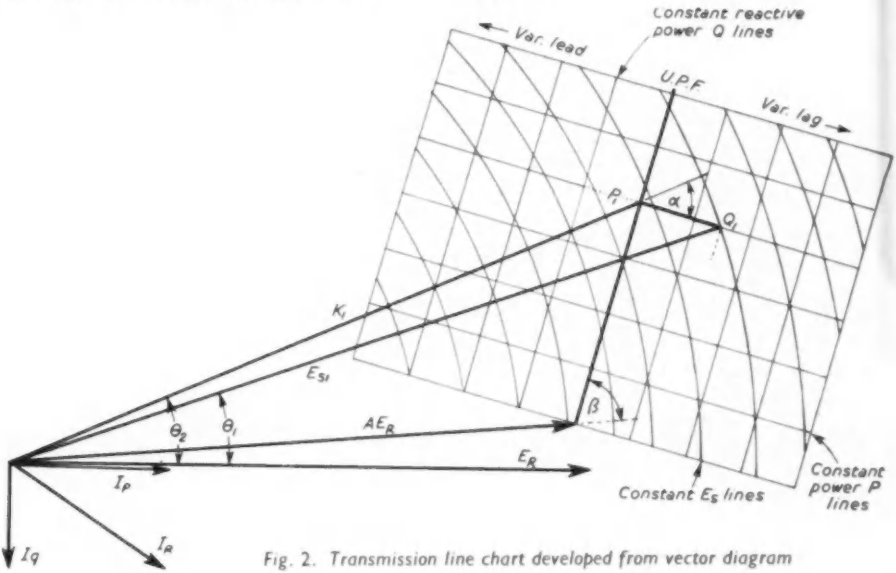


Fig. 2. Transmission line chart developed from vector diagram

The following practical example illustrates the methods and labour entailed in obtaining the information on line performance. A 100-mile 275 kV overhead line having duplex 0·175 sq in. equivalent copper S.C.A. conductors is considered. The characteristics of the line are

Impedance $Z = 0{\cdot}125 + j0{\cdot}66$ ohms/mile
$= 0{\cdot}0165 + j0{\cdot}087$ %/mile on 100 MVA base.

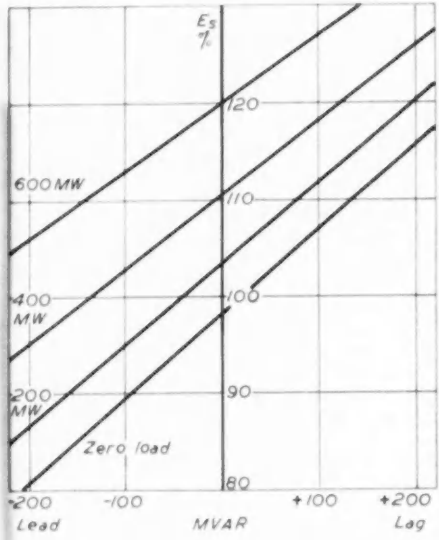


Fig. 4. Relationship between sending end voltage and reactive power received

Susceptance $Y = 4{\cdot}4$ micromhos/mile
$= 0{\cdot}334$ %/mile on 100 MVA base

$A = D = 0{\cdot}985/0{\cdot}15° =$ a numeric.

$B = 66{\cdot}95/79{\cdot}8°$ ohms $=$
$8{\cdot}82\%/79{\cdot}8°$ on 100 MVA base.

$C = 0{\cdot}0004385/90{\cdot}5°$ mho $=$
$33{\cdot}3\%/90{\cdot}5$ on 100 MVA base.

The nominal π circuit representing this line is shown in Fig. 3, together with the symbols used for the various quantities. The receiving end voltage E_R is assumed constant at 100% throughout these typical calculations, and a per unit method based on 100 MVA is used.

(1) E_s Chart

E_s has to be calculated in magnitude and phase for a series of received powers at u.p.f.

Now

$$E_s = AE_R + BI_R$$

so for zero power, $E_s = A = 0{\cdot}985/0{\cdot}15°$ p.u. $= K_1$

for $\frac{P}{100}$ MW power $E_s = A + BP$

and, so for 100 MW, $E_s = A + B$
$= 0{\cdot}985/0{\cdot}15° + 0{\cdot}0882/79{\cdot}8°$

i.e. $K_1 = 1{\cdot}004/5{\cdot}1$

Angle α has to be calculated for each of these conditions. This angle, as can be seen from Fig. 2 is $\theta_2 + (90 - \beta)$ where β is the characteristic angle of the constant B.

For zero load $/\alpha = 10{\cdot}35°$, for 100 MW load $/\alpha = 15{\cdot}3°$.

Now $Q = E_R I_{RQ} = I_{RQ}$ in this case.

The equations for E_s are therefore

at zero load, $E_s = 0{\cdot}985 + 0{\cdot}0882.Q.0{\cdot}9837$

at 100 MW load, $E_s = 1{\cdot}004 + 0{\cdot}0882.Q.0{\cdot}9646$

These equations have been evaluated for various values of active power and the resulting chart is shown in Fig. 4.

(2) Power Loss Chart

Using the π method of representation there is a constant generation of reactive power at the receiving end of the line if E_R is constant. This reactive current has to be added to the load current to determine the total current in the line and thus the I^2R losses.

Reactive generation at receiving end = 16·7 MVAR.

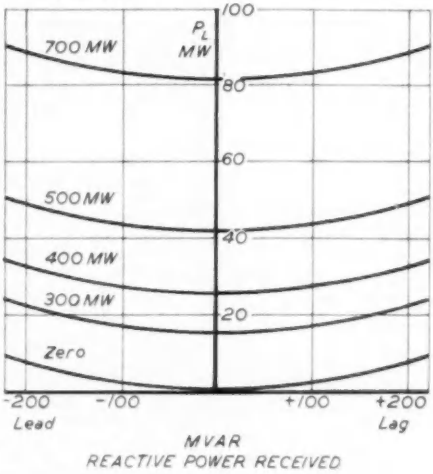


Fig. 5. Variation of line losses with reactive power received

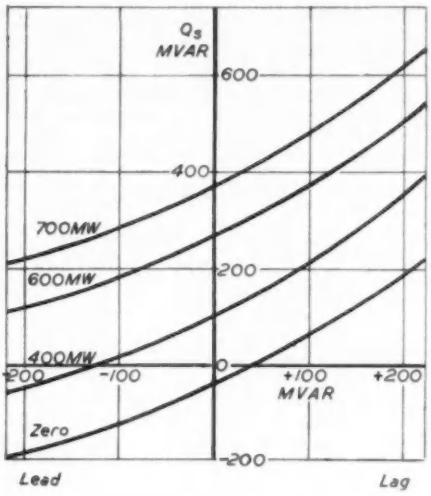


Fig. 6. Variation of reactive power sent with reactive power received

At zero load, line MVA = 0 − j16·7, current = 0·167 p.u.

$$I^2R = 0{\cdot}167^2 \times 1{\cdot}65 = 0{\cdot}046 \text{ MW}$$

At 100 MW u.p.f. load, line MVA = 100 + j16·7 = 101·4.

Hence $I^2R = 1{\cdot}028 \times 1{\cdot}65 = 1{\cdot}695$.

Similar calculations may be made for other loads, and the resulting curves plotted as MW to a base of MVAR, as shown in Fig. 5.

(3) Q_s Chart

The I^2X losses in the line are compensated to some extent by the reactive generation in the line. This varies as the square of the voltage and thus in this particular example the reactive generation = $E_s^2.16{\cdot}7 + 16{\cdot}7$ MVAR.

TRANSMISSION TABLE FOR 100 MW LOAD $E_R = 100\%$

Q_R MVAR	E_s %	Q_s MVAR	P_L MW	θ Degrees
300	126·0	325	14·8	2·2
250	121·7	265	10·6	2·5
200	117·4	198	7·2	2·8
150	113·2	136	4·6	3·4
100	108·9	78	2·8	3·9
50	104·7	25	1·8	4·5
0	100·4	−24	1·7	5·1
−50	96·1	−70	2·4	5·8
−100	91·9	−110	3·9	6·6
−150	87·6	−146	6·3	7·4
−200	83·4	−179	9·4	8·3
−250	79·1	−207	13·2	9·3
−300	74·8	−236	18·1	10·4

At zero load, $I^2X = 0{\cdot}24$.

Generation $E^2C = 16{\cdot}7(0{\cdot}985^2 + 1) = 32{\cdot}9$.

$Q_S = Qr + I^2X - E^2C = O + 0{\cdot}24 - 32{\cdot}9 = -32{\cdot}7$.

At 100 MW U.P.F. load, $I^2X = 8{\cdot}94$, $E^2C = 16{\cdot}7(1{\cdot}004^2 + 1)$, $Q_S = 0 + 8{\cdot}94 - 33{\cdot}5 = -24{\cdot}6$. Similarly for other loads, and the Q_s chart is shown in Fig. 6.

(4) θ Chart

θ is evaluated for each particular case from the equation $\theta_1 = \theta_2 - \sin^{-1} \frac{K_2 Q \sin\alpha}{E_{s1}}$. All the constants of this equation are known if the other charts have been determined.

At zero load, $\theta_1 = \theta_2 = 0{\cdot}15°$.

At 100 MW U.P.F. load, $\theta_1 = \theta_2 = 5{\cdot}1°$.

At 100 MW 100 MVAR load, $\theta_1 = 5{\cdot}1 - \sin^{-1} \frac{0{\cdot}0882 \times 1 \times 0{\cdot}263}{1{\cdot}004}$

$= 5{\cdot}1 - \sin^{-1} 0{\cdot}0214$

$= 3{\cdot}85°$.

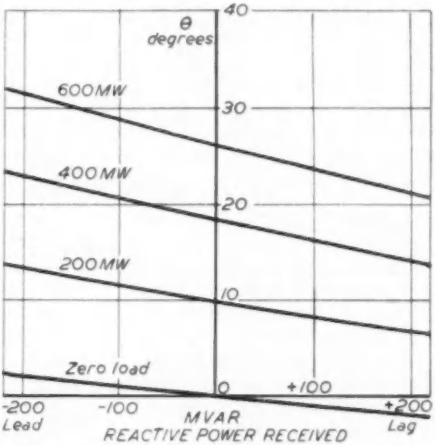


Fig. 7. Variation of displacement angle with reactive power received

Similarly for other load values, and a chart can be plotted as in Fig. 7.

Tabular Method of Presentation

The line performance data can be presented graphically or in tables. The tabular method tends to be a little complicated owing to the large number of variables. It is suggested that the receiving end voltage and power are taken as parameters, the receiving end reactive power as the independent variable, tabulating active and reactive power losses and angle θ. Two typical tables are shown in this article. To cover the information that would be shown on four charts, eight such tables are needed.

TRANSMISSION TABLE FOR 400 MW LOAD $E_R = 100\%$

Q_R MVAR	E_s %	Q_s MVAR	P_L MW	θ Degrees
300	133·6	460	39·6	13·2
250	129·7	392	35·4	13·9
200	125·9	325	31·9	14·6
150	122·0	262	29·2	15·5
100	118·2	205	27·5	16·5
50	114·3	152	26·6	17·5
0	110·5	102	26·5	18·5
−50	106·7	57	27·2	19·7
−100	102·7	17	28·7	20·9
−150	99·0	19	31·0	22·3
−200	95·1	−52	34·2	23·6
−250	91·3	−81	38·0	25·1
−300	87·5	−104	42·9	26·7

Conclusions

The straight line chart for transmission line voltage determinations has several advantages over the normal circle diagram type of chart. The charts for reactive power requirements, power loss and displacement angle provide useful information for performance checks and are easily calculated for any particular case. The extent to which such charts or tables are developed depends upon the demand, but a general selection of charts could be compiled to give an outline of transmission line performance.

Staff Continuity

Labour Turnover Statistics of Electrical Industry Analysed

TRAINING operatives for any kind of industrial work is a comparatively expensive undertaking, and for this reason alone managements try to reduce labour turnover to a minimum. An interesting report on this subject has recently been issued by the British Institute of Management, based on an analysis of the relevant statistics submitted voluntarily by 227 establishments. The outstanding conclusion reached is that, contrary to the commonly held view, smaller establishments have higher labour turnover rates than large organisations. It had been argued that the more personal relationship possible between management and workers in small firms would favour staff continuity.

Twenty electrical firms were represented in the survey, five being electrical plant manufacturers, three cable makers and the remaining twelve concerned with communications, lamps and electronic equipment. The first group (electrical plant) had an annual labour turnover rate of 24% of its male staff and 54% of its female employees. Out of those men who left, 15% were discharged and 55% resigned for "works reasons." This classification includes the following causes over which management is presumed to have some control—remuneration, hours of work, physical working conditions, dissatisfaction with job, relationship with fellow workers and supervisors, and personal betterment.

Wires and Cables

In the wires and cables there was 44% changeover of men, while for women the rate was as high as 103% of total employees. Here 20% of the men leaving were discharged and 48% left for works reasons. For women, the comparative figures were 14% and 29%.

Communications, etc.

Finally, in the communications, etc., classification, male turnover was 27% and female 45%; 18% of the men were discharged and 49% left for works reasons.

The report, of which further details can be obtained from the Institute at Management House, London W.1, follows a similar investigation for the first six months of 1949. For men the percentage of those leaving who had completed a year's service or less has increased from 55·7 to 59·7, and for women from 57·6 to 61.

Redundancy

Expressed as a percentage of total leavers, redundancy in the electrical plant manufacturing industry accounted for 4% of men and 14% of women. In wires and cables comparable figures were, men 12% and women 9%. In communications and electronics this heading accounted for 11% of men and 3% of women. The heading of redundancy includes other reasons besides recession of trade. Shortage of materials, reorganisation, technological changes and seasonal fluctuations in trade are other reasons included.

The report concludes that while all resignations for "works reasons" may not be "unavoidable" or the fault of management, resignations for these reasons provide management with a possible field for investigation and action.

Our readers' views . . .

The Grass-Dozer

METEOR'S note concerning lawn mowers appears to be in the nature of a cry from the heart.

Some time ago, I stripped my own mower, intending to electrify it, but found that the shaft extensions were not long enough to permit this to be done. After considerable thought, I conclude that all that is necessary is a f.h.p. motor, $\frac{1}{3}$ or $\frac{1}{4}$ h.p., arranged to drive the cylinder cutter only.

The greatest amount of energy expended with the normal mower is in driving the cylinder and not pushing the whole machine. A double-wound transformer should be incorporated but because of voltage drop would have to be fitted on the machine adjacent to the motor.

The remainder of your specification indicates a woeful lack of gardening experience. Long grass and weeds should be non-existent as the long tough grasses can be eradicated and the weeds destroyed with modern hormone fertilisers. To suggest that the grass cuttings should be deposited in a neighbour's garden indicates a very generous nature, as to present one's neighbour with the best part of which should comprise the compost heap, is indeed, a generous gesture.

Despite all this, I do commend your championship of the cause of the electric mower, as during my very temporary trials I found it an excellent answer to the problem.

And so, more power to your elbow.

John H. Mollan

LEEDS

◆ ◆ ◆

"Made in Germany"

NATIONAL newspapers reported on August 4, 1950, that the re-armament programme would hit, among other things, the production of electrical appliances. The same newspapers on August 19, 1950, refer to the "new trade agreement between Britain and Germany" and it is particularly noted that electrical appliances are to be *freely imported* from Germany to Britain.

Surely, such crazy mishandling of our national interests is almost criminal. Obviously, British manufacturers cannot compete in export markets without home trade business, and anyway, is this the right time to hand our home market over to the Germans?

L. G. Hawkins

L. G. HAWKINS & CO., LTD.

*[Note—While we sympathise with our correspondent's views, it must be borne in mind that many of the newspapers were a little ahead of events, since the agreement—an extension of the Annecy Agreement reported in our pages for October 13, 1949—has not yet been approved by the Allied High Commission, and details will not be released until then. Until details of any relaxations of import duty are announced, we prefer to reserve judgment.—*ED.]

◆ ◆ ◆

Plug and Socket Plastics

AS one concerned with accessories design and manufacture, I would like to congratulate the authors of the two letters which appeared in your issue of August 3 under this title.

In contrast to the dangerously wild opinions which have recently gained currency, these well-informed and essentially sane comments are reassuring to those of us who are alive to the danger of making changes before reconciling theory with practice.

In this particular case, practice is the essence of the matter, for experience has shown that phenolic plastics are perfectly satisfactory provided a modicum of intelligence is applied to the positioning of the product—a precaution necessary with everything—whatever material it is made from.

Apart from the fact that phenolic material is officially approved for the purpose, what is the advantage to be gained by blindly switching over to amino-plastic which is shown to have weaknesses likely in practice to manifest themselves equally, possibly more, frequently?

And what about cost? No manufacturer objects to a general increase in price arising from authoritatively specified changes in design or materials, provided the market will stand the increase. But it is nothing short of a national tragedy when unnecessary changes increase selling prices to a level at which the public are denied proper facilities, and overseas markets are lost to foreign competitors. This is no fanciful picture, the tendency can already be seen not only in restricted exports but in the officially enforced reduction in the number of socket-outlets in new houses.

What is the sense of making the finest sockets in the world if no one can afford to buy them?

"Realist"

BIRMINGHAM

Making the Most of Power

B.A. Birmingham Meeting opens with Review of Energy Uses

FOR its 112th annual meeting the British Association for the Advancement of Science has chosen Birmingham, and yesterday evening this year's president, SIR HAROLD HARTLEY, K.C.V.O., C.B.E., M.C., F.R.S., delivered his inaugural address at a meeting held in the city's Town Hall. It was appropriate that for the centre of so many important discoveries during the industrial revolution, he chose as his theme "Man's Use of Energy." Quoting Carlisle's classification of Man as a tool-using animal, ". . . without Tools he is nothing, with Tools he is all!", Sir Harold traced the history of mankind's use of tools, and its results from the inventions of the textile and metallurgical pioneers, through the work of Watt, on to the thermodynamical discoveries of the nineteenth century and to the development of the internal-combustion engine and of electricity. With a quick survey of the past fifty years, this review was completed, and the problems of the present and the future came up for consideration.

Taking every form of energy into account, including food for men and beasts, it was estimated that the world needed a gross yearly intake equivalent to 4,000 million tons of coal. On a thermal basis, food from agriculture gives 21% of this, coal and lignite 41%, wood 6%, oil 24·5%, natural gas 6·5% and hydro-electricity 1%. At the prevailing rate of consumption, the world's resources of coal were available for centuries, while there was no fear of oil shortages for some decades, and in any case oil from coal and shale will provide substitutes. Hydro-electric power, if fully developed, would give the full amount of inanimate energy which man was using.

Metal shortages might result in a world problem before those associated with fuel. Estimated reserves of copper, zinc, lead and tin were adequate only for some decades, and geologists were not optimistic of finding large new ore fields. In the result, we should be faced with an iron/light alloy metal economy.

Efficiency

Energy was essential to progess, and it was important to note that in the quarter century ending with 1938, Britain's total fuel consumption did not change, although the population had increased by 10% and more energy was used. Increased efficiency was the reason, and wartime experience showed that there were still great improvements to be made in this respect. In the energy industries, for instance large savings could be achieved by raising th standard of all plant to that of the best practice. Combined heat/electric schemes also helped to conserve fuel. In industry generally, the overalle fficiency of energy used was probably less than 15%, and there was an urgent need for large economies. The gas turbine, the heat pump, wind power and geothermal power all had important possibilities.

The unequal distribution of energy resources made power transport of increasing importance. High-voltage direct-current techniques were specially promising, and offered the possibility of linking the British and European grids to secure better balance between capacity and requirements.

Sol.r radiation reaching the earth's surface provided energy 50,000 times as great as the consumption. Some 40% of it was used in evaporating water and 1% in lifting it into the atmosphere, whence was derived our water power. Further, 1% of radiation falling on vegetation was used in photosynthesis, which resulted in fuel and food. Long-term researches into the economic use of solar energy was a duty we owed to posterity, living as we were on reserves.

Nuclear Energy

The story of nuclear energy, continued Sir Harold, showed what could be done if science were used lavishly to penetrate nature's secrets. As the recent World Power Conference discussion showed, many difficulties remained to be overcome before the use of this energy source became economic. With the world's need for energy. it would be a tragedy if the fear of competition from nuclear piles were to delay in any way the immediate development of the more conventional and better understood sources of energy.

Nuclear plants produced by-products and radiations that were dangerous to life. As a result the new science of auto-mechanisms had received impetus, acting as a substitute for the drudgery of the human brain just as the machine was the saver of manual labour.

In conclusion, Sir Harold emphasised the need for pooling information on the needs of every country in the world, its natural resources, human geography, economic structure and capacity to produce and consume.

Problems and Practice

IN ENGINEERING

Neon Test Lamps

MR. S. ARNOLD, in his contribution on Neon Test Lamps, attributes the glow in his neon tester to the deposit left by a blown fuse. He would have found, however, had he removed the fuse carrier and closed the main switch that he would still have had a glow shown by his tester on each phase at the isolator, this being due to the capacity between conductors. (ELECTRICAL TIMES, 20 JULY, 1950.)

This can be very misleading when using one of these instruments for testing, and is something which needs to be carefully watched if one is to avoid erroneous deductions.—*John Pugh.*

I MUST beg to differ from Mr. Pugh's observations. The type of lamp used in the aforementioned article was a 230 V working neon indicator lamp, manufactured for standard bayonet type lampholders and similar in size to a 230 V 15 W pigmy lamp. The test at the isolator was between each phase and earth and with the fuse carrier removed the lamp did not glow.

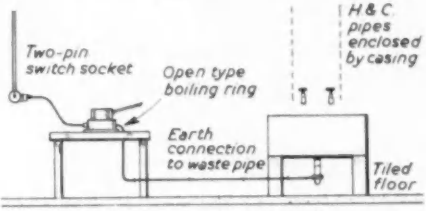
I am aware of the neon testing pencils ("Testascope," I think they are called) which are frequently used and of the misleading capacitive effect that can cause them to glow, which, of course, endorses my sentiments regarding the use of neon lamps for circuit testing.—*S. Arnold.*

Straightening out Cables

WHEN wiring up buildings where long lengths of cable have to be handled and drawn into conduit, it is necessary for the cable to enter the conduit absolutely straight if drawing in is to be reasonably easy. The use of a suitable guide is of great assistance when feeding cable. A guide can be made from a piece of linoleum about two inches square and strengthened by a wooden framework round the outside. This linoleum should be punched with a series of holes, of a size sufficient for the wires to pass through singly. The holes should be positioned so that as the wires pass through them they will have the same position they are to occupy in the conduit. In use the guide is placed about four inches from the conduit entry, the wires should be fed through the guide and a draw-wire attached, and the wires fed into the conduit with one hand and the guide held with the other.—*W.E.W.*

Faulty Earth

A HOUSEWIFE reported receiving a severe shock when washing crockery in the usual deep sink fitted under the kitchen h. and c. taps. The layout was as sketched. Supply to an open type boiling ring was taken from a two-



Ineffective earthing connections

pin switchsocket, and with commendable care, the local ironmonger-electrician had run an earth wire from the boiling ring to the sink waste pipe, possibly choosing the waste pipe, because the cold water pipe was enclosed by wooden casing.

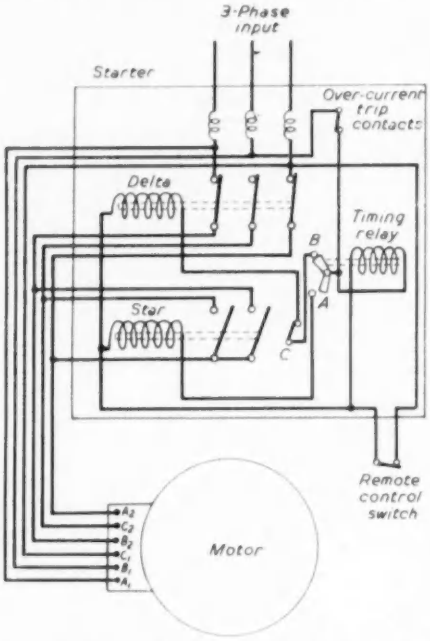
Unfortunately the discharge end of the waste pipe terminated in open air, and a saucepan boiling over with considerable gusto, sufficient leakage was set up to electrify the waste pipe, wa hing water and housewife.—*F.S.*

Failure of Contactor Mechanism

CONNECTIONS for an automatic star-delta starter used to control a 12 h.p. 3 ph pump motor, are shown in the diagram overleaf. The starter is governed by a water level switch, and the starter is shown with its contacts in the running or delta position.

The motor windings became burnt out several times although current tests indicated no overload, the usual symptoms being one fuse melted, but good insulation tests. The trouble appeared to occur mainly during periods when low voltage was suspected. The operation of the starter was as follows. Closing of the remote control switch energised the coil of a timing relay and also the coil of the star contactor, through the contacts "A" of the timing relay, which contacts were normally

closed. An electrical interlock contact "C" was fitted on the star contactor and a mechanical interlock lever was provided between the star and delta contactors to avoid the possibility of them both being closed at once. As the motor started up in star, the operation of the



timing relay resulted in a transition period during which the contacts "A" and "B" were both closed. However, the delta contactor was not energised until the timing relay had opened "A" and de-energised the star contactor, thus closing the interlock contact "C".

It was found that the timing relay coil was liable to release its armature if the voltage fell slightly. As the armature fell back it closed contact "A" and would thus energise the star contactor before de-energising the delta contactor, because the electrical interlock contact "C" was inoperative with a delta-star sequence. The closing of the star contactor, or its attempted closing, would de-energise the delta contactor by opening "C." It seemed, however, that on occasions the mechanical interlock lever jammed the contactors partly closed with various results. A recording ammeter indicated that the motor at times continued to run and emptied the pump. At other times a fuse was blown and the motor single-phased and burnt out. No doubt the interlock lever had become worn slightly, but it was considered that the starter was much too unreliable for the conditions and it was replaced.

The mechanical jamming evidently accounted for the fact that the protective trips, although frequently tested with quite satisfactory results, always failed to switch the current off the motor. The opening of the over-current trip contacts, of course, could not trip the contactors due to the jamming. The unusual operation of the starter was not spotted for some time; this may have been due to the fact that the starter was always opened by an unskilled person after a failure, or it may be that the vibration caused by opening the interlocked isolating switch and opening the heavy starter door was sufficient to release the contactors. —*J.W.*

Loose Connections

IT was reported that a 65 h.p. 3 ph wagon hoist lowering limit switch was faulty, as the hoist was occasionally running on.

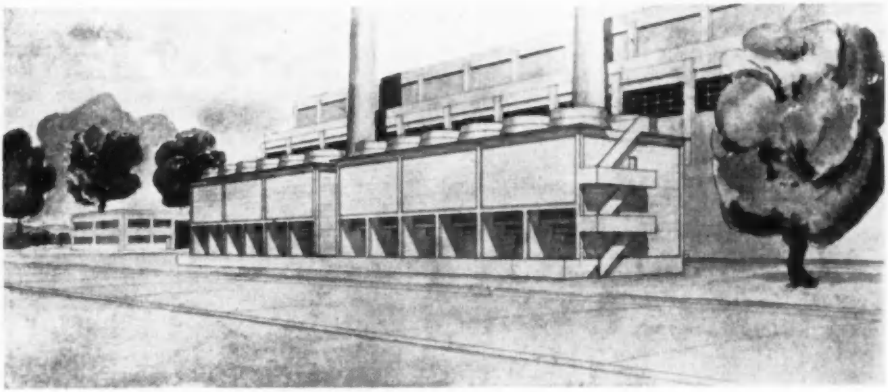
The limit switches, controller, protective panel and wiring were inspected and tested without success. We then decided that the trouble was not electrical but due to a mechanical fault on the pole piece of the protective panel. To prove this, we waited until the fault came on, and then isolated the panel, but it did not trip. The contacts were tested to see if they were welded, and the hold in coil tested for leakage. The pole piece was then disturbed and out it dropped. But, try as we may, we could not get that panel to stick in with the power off.

The operator happened to mention that he had heard the panel vibrating several times. This meant nothing to us, but to please him we waited until it began to vibrate. This we noticed only happened on the lowering side.

So once again we examined all the electrical gear, but instead of a short we were now looking for a loose connection, which we found in the lowering limit switch, due to a break in the spring. This was made good and our troubles were over.

This happened many years ago, and at the time I thought it was just a coincidence that when we made good that loose connection it stopped the panel from sticking in. But since, I have had many an a.c. contactor and solenoid sticking due to a loose or bad connection.— *J. Arstall.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.



COOLING TOWER DESIGN

Film-Flow and Induced Draught Results in Small Size and High Efficiency

MUCH interest has been aroused at this year's British Association Exhibition at Birmingham by the models of modern cooling tower design. This interest is mainly due to the fact that considerable agitation has been evinced against the more conventional forms of cooling tower due to the "spill-over" of water and also to the unsightliness of the large concrete structures. As far as the latter complaint is concerned, there are those who hold that cooling towers possess a certain functional beauty, and also those who hold an opposing view, but there can be little doubt that in heavily populated areas, the water carry-over can be a positive nuisance, particularly in winter when icing conditions exist at ground level.

For these reasons, any system of cooling circulating water which combines the virtues of low initial cost, low running cost, easy maintenance, small size and minimum spill-over is of great importance. One system, for which these virtues are claimed, is the "All-Film Flow" type, patented by I.C.I., and made by Film Cooling Towers (1925) Ltd., of Lionel Road, Kew Bridge, Brentford, Middlesex.

Princ'ple of Operation

The conventional type of cooling tower utilises a spray system and the natural uprising draught to provide a large area of contact between the cooling air and the circulating water. Further heat transfer is aided by allowing the water to drip over a series of wooden laths, through which the incoming air is passing. As a consequence, any water particles of such a size that their normal terminal velocity is less than that of the uprising draught are carried up the tower and discharged at the top. In "All-Film Flow," this is avoided by maintaining the circulating water as a continuous film of liquid over a wooden grid. How this is accomplished can be seen from the sketch (p. 340). The circulating water is distributed primarily by means of the normal type of open trough work. Where turbulence is likely to cause water splash the trough work is partially sealed. From the main trough system, the water discharges into subsidiary spreader troughs by means of submerged tubes. In this manner splash is again avoided. As can be seen, the spreader troughs have special weir-shaped notches cut in the sides, and the bottom of the trough is serrated and rests directly on the top layer of a grid of timber. The notches are spaced four inches apart, and the water flowing through them fans out into a film on the side of the trough. As the troughs are spaced six inches apart and run the length of the tower, a controlled water distribution point occurs in every nine square inches of tower area.

The filling employed is known as "grid-packing," due to its general appearance in plan view. It is composed of a number of

horizontal trays of parallel laths, the layers being alternately at right angles to each other. As the laths are spaced two inches apart, the plan view appearance is that of a two-inch square network. As mentioned before, the lower edges of the spreader troughs are serrated and rest directly on the top layer of the grid packing. Thus, the film of water descending from the walls of the troughs, collects at the nodes formed by the serrations and is transferred to the packing without splash or disintegration. By serrating the laths in a similar manner, the water film can be transferred through the whole of the stack in an unbroken state. At each transference the plane of flow is changed through a right angle, and thus any tendency for a temperature gradient to form across the film is stopped. So well is the film formation maintained that even with water densities of up to 250 gallons/hr/sq ft of tower cross-section, it is difficult to observe the actual flow of water. The packing and troughs simply appear to be made of highly glazed timber.

Air Flow

The grid formation provides a series of easy and unobstructed passages for the rising air. A point of interest is that in this system the weight of the water is entirely carried by the grid and troughs, and not, as in the normal spray system, partially carried by the actual air stream. Further, although no water droplets or drip bars are present to increase the pressure drop across the tower, the most intimate mixture of air and water takes place, giving rise to an unusually high heat transfer per given pressure drop.

In order to reduce the height of the tower and to provide a sufficient air flow, fans are used to provide either forced or induced draught. The latter is generally preferred for several reasons. First, forced draught pushes air into the tower at high velocity and violent turbulence occurs when the air has to change from the horizontal to vertical direction prior to passing up the stack. This represents an increase in the pressure drop across the tower, which in turn is reflected in greater energy consumption by the fan. On the other hand, induced draught draws air into the tower at low velocity and permits a more equitable distribution.

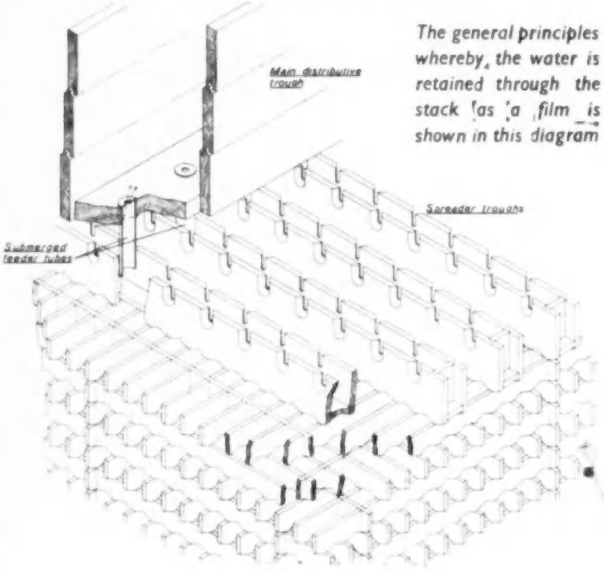
Secondly, with forced draught there is a danger of re-circulation due to moist air leaving the tower being drawn into the fans, whereas with induced draught the air is expelled at high velocity from the top of the tower and re-circulation thus avoided.

The fan, which is generally mounted on top of each tower unit, can either be driven individually by totally enclosed induction motors, or a series of units can be driven through appropriate gearing from a single motor. It is usual to use a straightforward induction motor, although in a few cases variable speed machines may be installed to cope with load variations.

General Considerations

The artist's impression of an actual installation given at the beginning of this article shows the general appearance of a set of units as would be used in a medium-sized power station. In this case, twelve units are installed, erected in groups of two. The circular housing on top of each unit contains the induced draught fans. When the station load is light it is usual to cut out units as required. It is also practicable to isolate any one unit for maintenance and repair work, without seriously reducing the output of the station.

Our thanks are due to Film Cooling Towers (1925) Ltd. and to Mr. E. A. Howe for the information given in the above article.



The general principles whereby the water is retained through the stack as a film is shown in this diagram

MORE MAINTENANCE HANDICAPS

Further suggestions for Improvements

by W. H. ATKINSON

THE amount of avoidable maintenance which will require to be squandered on an installation is often determined at the outset by lack of foresight in design or undetected liberties taken by the erectors. Wiring runs are a good example of this.

A case which comes to mind is that of a hoist serving nine floors. Each landing, naturally, was provided with a gate, or gates, electrically interlocked. In the cage there were two gates with toggle switches and a stop button. In the "stop" circuit, therefore, there were 13 switches and a length of flexible cable, all wired in series. This loop was the most common source of fault in the installation.

When trouble arose it was the custom to check each contact in turn with a test lamp to earth. When no glow was seen the fault was presumed to be either in that lock or in the wiring immediately preceding it. Unfortunately, when drawing in wiring it is possible to confuse the sequence in such a way that step-testing is extremely difficult. For instance, in Fig. 1 the sequence is 1273465. This state of

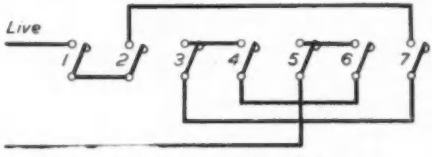


Fig. 1. Wiring runs are out of sequence

affairs is not uncommon, because it often means easier runs on the job. When investigating faults, however, to gain access to the locks it was necessary to open the gate, lean through into the well holding by one hand to the structure, remove four screws and with a portable lamp tied round the neck, probe the contacts with a test-lamp. Should the fault lie in the last lock tested the best part of an hour was wasted in diagnosing before the repair was started.

The Proper Way

Looking at that job through maintenance eyes the following alterations would have made things a great deal easier.

1. In the control room a D.P. change-over switch, disconnecting the stop circuit and placing it in series with a transformer bell test set would demonstrate at once if there were an open-circuit fault.
2. The loop comprising cage locks, stop button and trailing cable should have been brought to the control room and not joined to the landing gate loop in mid-well, where access during fault conditions was impossible without shorting out the gate-locks and driving the cage to a suitable position. Each section then could be tested separately and the fault localised.
3. The locks would have been in correct sequence and a sketch of this mounted on the wall next to the controller.
4. All locks would have been accessible from outside the gate structures by removing sheet-steel covers, thereby decreasing the dangers and saving repair time.

Motor Shortcomings

Viewing electric motors from the maintenance standpoint the following suggestion would arise. Certain manufacturers, it is true, do include one or other of the features mentioned here.

1. Tapped holes in motor end covers should be provided (as is common in steam practice) to facilitate removal without driving wedges.
2. The inner ball-race covers should be of mild steel, and of ample proportions, thereby serving to withdraw ball-races without danger of cracking. It is sometimes extremely difficult to get the jaws of pullers into position and most electrical fitters have resorted to breaking off a faulty race at one time in their experience.
3. In single-phase machines it could be possible to withdraw end covers leaving centrifugal switches or brushgear intact. Certain motors are quite unnecessarily difficult to dismantle.
4. The tubular shanks of terminals might be locked by raised portions of the insulated block so that they cannot turn when the nuts are being tightened or loosened.
5. Access to the gap with feelers is another much appreciated refinement. Indeed, some insurance companies require their surveyors to record the clearance at each inspection, if possible.

6. If the terminal box can be removed from one side to the other or to the top of the motor, many a body-straining, awkward moment would be avoided when attempting to reach hidden terminals.
7. Not only should a legible name-plate be provided, of course, but if the information were stamped on the shell the nuisance of the missing plate would disappear.
8. One last point, the end-covers should never be interchangeable and the outer diameter of the two races should be different, so that incorrect assembly is impossible.

Some of the foregoing implied criticisms of such a well-developed machine as the induction motor might appear to be carping, but even minor improvements can be important sales features, and will earn the blessing of possibly the most harassed members of the industry.

INTERNATIONAL INTERCONNECTION

EARLY last year a mission of engineers, representing the power supply systems of Western Europe, travelled over 4,000 miles in the U.S.A., investigating the administrative and technical methods used in that country for obtaining maximum output from existing electrical power plant. Arranged by the Organisation for European Economic Co-operation, this trip made possible comparisons with existing European practice, and the conclusions reached by those who made the journey have now been published by O.E.E.C. under the title "Interconnected Power Systems in the U.S.A. and Western Europe."

Interconnection

There are a number of large interconnected groups, or "power pools," in the United States today, and one, known as the South Atlantic and Central Areas Group, is selected for description in some detail. It had a 1948 peak load of 19,000 MW and covers an area of some 1·5 million square miles—comparable with the neighbouring countries of Western Europe. More than 80 public utilities are involved.

The Group has no centralised system of control, and a utility's responsibility to the Group is limited in general to fulfilling contractual obligations for energy transfers to immediate neighbours, and to conforming with an agreed plant maintenance programme. The method of working is for each utility to keep its power transfers at the agreed amounts by means of automatic tie line load control applied to the generators in one or more stations. This automatic control is usually biased by frequency, so that a low frequency tends to increase exports and decrease imports. One station acts as residual frequency and time error controller for the whole system. American engineers with whom the subject was discussed considered that such a "loosely knit" type of interconnected operation would be impossible without biased automatic control. The usual bias is about 1% of the utility's system load or a maximum of 20 to 30 MW per one-tenth of a cycle.

Regarding allocation of load to the most economical units within the Group, it was felt that 80 to 90% of the total savings theoretically possible occurred within each utility, and a further 10% between adjacent utilities. Only a very small percentage was saved by allocations over a greater distance.

Arrangements for plant outage for maintenance are more closely co-ordinated throughout the Group than are those for load despatching. A full meeting takes place each year, with regional meetings twice yearly in addition.

Conclusions

The first recommendation of the Mission is, naturally, that its findings should be distributed as widely as possible. Turning to results, there is a recommendation that discussions of possible energy interchanges in Western Europe be left to the free negotiation of the utilities concerned, and that these negotiations be aided by large scale surveys prepared by the appropriate organisations. Regional committees of operating engineers should be constituted between neighbouring countries to discuss interchanges of energy by contract, and since currency troubles are likely to be a prominent obstacle in this respect, the intervention of O.E.E.C. may be helpful. Finally, provision should be made for some technical association to facilitate the exchange of experiences and ideas in station operation.

Published with the report is a survey of interconnections in Western Europe, annotated with reference to the Mission's report.

Economical Annealing

Recuperative Cycle used in Wire Manufacture

A FURNACE installation recently installed at the Ambergate works of Richard Johnson and Nephew Ltd., for the bright annealing of wire utilises a heat recuperative cycle for conserving power.

The installation consists of three vertical furnaces each of 90 kW, 3-phase loading and eighteen annealing containers 33 in. diameter and 68 in. deep holding 20-25 cwt. of wire, the base casting being slung from the pot head by three heat and creep-resisting bars; thus enabling a light pot envelope to be used, allowing rapid heat transfer. Twelve of the pots are normally housed in brick-lined cooling pits, the remaining six being stored in pits which are thermally insulated to form recuperators, in which newly charged pots are placed alongside those removed from the furnace, thus pre-heating the new charge to about 200° C. This not only conserves power, but the slow initial heating drives off any remaining lubricant from the rolling process, without "cracking," thus improving the final finish.

General view of furnace shop, with furnaces at far end, recuperators in the middle, and cooling pits in foreground

Method of suspending charge from pot head (pot envelope removed)

Furnaces

The shell of each furnace consists of a welded mild-steel cylinder with a flat bottom plate. The top plate has a cylindrical projection down into the furnace chamber to protect the refractory bricks at the mouth and also to guide the charge container so that it cannot come into contact with the heating elements and damage them.

Special attention has been given in the design to the matter of temperature uniformity in the charge and to reducing the overall heating time. The side walls of the furnace are made of 3 in. of refractory material backed by 12 in. of insulation. The 3-phase heating elements are each in two sections and alternate coils are automatically switched off 10° C before the desired temperature is reached. This slows down the rate of heating prior to final operation of the automatic temperature control gear and so prevents any overshoot. A part of the heating elements is arranged in the bottom of the furnace to provide heat for the densest part of the charge.

Annealing normally takes place in an atmosphere of partially-burnt town's gas, which is cooled, scrubbed, and has its dew point reduced to —4° C. by a silica gel drying unit before being charged into the pot, which is rendered gas-tight by a water-cooled rubber ring between the pot-head and the envelope. The furnace temperature is 750° C, and the power consumption is from 200-220 kWh per ton of wire.

This installation was supplied by the General Electric Co. Ltd., and is the second of its kind to be supplied to Richard Johnson and Nephew Ltd.

overseas news

Another Volga Scheme

In Moscow last week the Council of Ministers announced a five-year power development programme for the River Volga. The programme envisages a two million kW hydro-electric station near Kuibyshev to supply increased power to Moscow, Saratov, and other cities and farming areas along the Volga. It is also proposed to use impounded waters from the river to irrigate almost two and a quarter million acres of semi-arid land in the Volga Basin.

The Sydney Trouble

The black-out troubles which descended upon Sydney, N.S.W., early this month are still giving the city a bad headache, although there has been some improvement in the situation. At one time there was 95 MW of generator capacity out of service. Bunnerong seems to have been the principal sufferer, for apart from generator sets out of action, much of the boiler plant was also shut down. To add to the difficulties, minor teething troubles developed with the new Velox steam generator recently put into operation. The background to the trouble is explained in a recent editorial of the *Sydney Bulletin* which reports that a week prior to the series of blackouts, "the city had been enduring the tail-end of one of the most remarkable and costly rainstorms of its history. For upwards of three months the rain had poured down steadily, washing away homes, roads, bridges, stopping coal supplies and generally playing 'Old Harry' with everything." It was this deluge, interfering with coal and gas supplies, and causing the rationing of gas, that threw a heavy load on the electricity undertaking at a time when some plant was undergoing repairs. According to reports, even the generators of a couple of harbour tugs were used to feed into the supply mains.

King Island Supply

The installation of a diesel engine power plant to supply Currie, King Island, Tasmania, with electricity is to be started shortly, and it is expected power will be available to residents before the end of the year. The installation will comprise two 102 b.h.p. diesel engines driving 70 kW alternators generating at 415-240 V, 3-phase, 50 c/s. It is understood that the first engine and both alternators are ready for shipment from England, whilst the second engine should be ready within the next two months.

Splitting the Commission

In the Legislative Assembly at Melbourne this month, a Bill was introduced to provide for the setting up of the Victorian Gas Authority, which is to take over from the Electricity Commission responsibility for the production of briquettes and other hard fuels, benzol and dyes. The Commission will thus be left to concentrate on the production of electricity.

Kiewa Project

British contractors will go to Australia next month to compete with French and United States concerns for the contract to build Victoria's new £(A)16 million Kiewa hydro-electric power station in the north-eastern part of the State. Consulting engineer to the Victorian State Electricity Commission, Mr. R. Bate, announced this on his recent return from his trip to England, the Continent and America.

Tobique River Project

The Power Corporation of Canada, of Montreal, is to supervise the construction of the proposed hydro-electric development on the Tobique River for the New Brunswick Electric Power Commission, it was stated earlier this month. The first hydro development undertaken by the province-owned undertaking since the erection of the Musquash plant about 30 years ago, the $5,600,000 Tobique River project will tie in with its grid system and steam plants. It will add 25,000 h.p. to the Commission's combined steam and hydro system and is designed primarily to serve the northern section of New Brunswick.

Grand Lake Extension

A Fredericton firm, the Caldwell Construction Co., has been awarded the contract for the construction of the New Brunswick Electric Power Commission's Grand Lake plants extension. This firm is to construct the new building and install two 6,250 kW generators. The buildings will be designed to house a further 15,000 kW unit already on order. Completion of the new plant, which is expected late in 1951, will give the Commission nearly 116,000 h.p. of power plant at its Grand Lake, Chatham, St. John and Musquash plants.

Diesel-Electric Locos

The new diesel-electric locomotive plant of General Motors Diesel Ltd. was inaugurated in London, Ontario, earlier this month. The factory is arranged into six major sections connected with the separate portions of a diesel locomotive: the diesel engine, the generator, control apparatus, traction motors, locomotive body, and trucks. The assembly-line principle employed in car production has been adopted to put together the

125-ton locomotive. Initially, the plant will turn out about three locos per week, but eventually it is expected that this rate will be increased to one per day.

Another Ontario Scheme

The Hydro-Electric Power Commission of Ontario is negotiating with the Province of Quebec for the power rights at Chaudiere Falls, Mr. R. H. Saunders, chairman of the Commission, has announced. It is considered that the present power development of 100,000 h.p. there could be expanded to 175,000 h.p.

The Budget Speech

The New Zealand Government is now preparing to invite overseas consulting engineers to undertake the design of two more major hydro-electric schemes for the North Island, the Prime Minister, Mr. Holland, disclosed in the course of his Budget speech last week. He also announced a number of tax concessions, including the exemption from sales tax of a further list of household appliances. Details of these are awaited.

N.Z. Imports

Token imports of certain electrical equipment from the United Kingdom into New Zealand during 1951, is allowed under a new licensing scheme. Intended to enable old-established business connections to be maintained, under this procedure the Government of New Zealand will give favourable consideration to applications to import up to 20% of the value of similar goods supplied in 1938. Goods covered include power distribution transformers up to 115 kVA single ph, and 325 kVA 3 ph, battery chargers, dry cells, storage batteries, radio sets, insulators, ceiling roses and appliance plugs, lamps, table, reading and bedside lamps, vacuum cleaners, electric cooking and certain electric heating appliances, and washing machines. Goods which are exempt from the requirement of a licence when imported from the U.K. and countries other than those listed in the schedule, include electric motors (except from 1 h.p. to 5 h.p.), generators, starters and controllers, lamp, furnace and welding carbons or electrodes, X-ray tubes, vacuum tubes, insulating materials, measuring, counting, testing, indicating and recording instruments and conduit. For certain other goods, including outdoor pole mounting switchgear, radio and microphone wires, electric ranges and refrigerators, licences will be granted only in exceptional circumstances. Imports of plugs and sockets (other than industrial), cord connectors, flushplates, 5 and 10 amp switches, and through-cord switches, will be allowed up to 25% of 1950 imports, while imports of switchboards, fuse boards, ballasts and chokes are limited to 50% of the 1950 amount.

Auckland Railways

Some preliminary planning had already been done in the proposal to electrify Auckland, N.Z., suburban railways, the Minister of Works, Mr. Goosman, stated recently. Details would be made known when the Government had completed consideration of the report made by the consultants, Sir William Halcrow and Mr. J. P. Thomas. The Consultatives submitted an interim report before leaving New Zealand late last year, and the complete report was presented in April.

Kroonstad Extension

The application of Kroonstad Town Council, Orange Free State, for permission to double the generating capacity of the town's power station, has been approved by the Administrator o the Free State. The town first applied for permission to extend the plant in 1945, but on the advice of the Electricity Supply Commission of South Africa, the Administrator recommended to the council that the taking of a partial supply from the Victoria Falls Power Co. should be considered. After protracted negotiations, the council entered into an agreement with the company, since taken over by the Electricity Supply Commission, and then waited for more than two years for the link-up with the Escom power line to the goldfields to take place. After the link-up had been augmented, the council was informed that the Commission was unable to guarantee that it would be able to supply the town with all the power it needed above the normal generating capacity of the power station in the critical years ahead. This prompted the council to renew its application to the Administrator. Some months ago, the Administrator, again acting on the advice of the Commission, rejected the application, but since then two interviews with the Administrator have taken place and the long-sought permission has been obtained. The project will cost £97,000 now, as against an estimated £60,000 when permission was first sought in 1945.

Milan Power

Last weekend saw the official opening of a new hydro-electric project in Italy which has been built for the Milan municipal electricity undertaking. Claimed to be Europe's largest dam, it is more than 1,000 yds long and 100 yds high, forming a reservoir with a storage capacity of 64 million cu metres of water, and is situated at San Giacomo di Fraele, in the Alps north of Milan. Its power plant is estimated to be able to generate 150 million units annually. Construction of the dam was first started ten years ago.

Japanese Action

Trade union representatives have been notified by the management council of the Japanese electricity industry of its decision to discharge 2,137 workers who are believed to be Communists or Communist sympathisers, it is reported. In its announcement the council has stated that workers who attempt to disturb the smooth operation of the industry will have to be dismissed. Police have already been mobilised in order to protect power plants against possible attempts at sabotage, apparently.

PERSONALITIES IN THE INDUSTRY

To facilitate co-ordination between the Research and the Engineering and Technical Organisations of their Company, the Board of British Insulated Callender's Cables, Ltd., has appointed **Dr. L. G. Brazier,** B.SC., M.I.E.E., F.A.I.E.E., to be the director of research and engineering. Dr. Brazier joined the former Callender's Cable and Construction Co. in 1925 and specialised in high voltage transmission research and development. Following the merging of British Insulated Cables and Callender's Cable and Construction Co. in 1945, he became director of research, and in March, 1950, whilst retaining this appointment, was elected an executive director of B.I.C.C. A pilot in the R.F.C. during the 1914-18 War, Dr. Brazier studied at the City and Guilds, South Kensington, between 1919-22, taking a degree in engineering. After working on mathematical research at the Royal Aircraft Establishment, he joined Callender's in 1925, being engaged in the development of the gas pressure cable. He has been responsible for the development of the B.I.C.C. Research Laboratories at Wood Lane, London, and during the 1939-45 War played a great part in the development of the buoyant cable, also radar development and prototype production.

Dr. L. G. Brazier

Newly appointed Birmingham manager of Lancashire Dynamo and Crypto Ltd. and its associated companies is **Mr. S. A. Hunter,** A.C.T.C. (Birmingham), A.M.I.E.E. He served an apprenticeship with the General Electric Co. Ltd., later becoming lecturer in the Electrical Engineering Department of the Birmingham Central Technical College. Subsequently, after a period with the Electric Construction Co. Ltd., he joined Foster Transformers and Switchgear Ltd. at their Birmingham office. Mr. Hunter succeeds **Mr. R. Greenwood,** M.I.E.E., who has been Birmingham office manager for Lancashire Dynamo and Crypto Ltd. since 1926, and who is now acting in an advisory and consultative capacity.

Mr. S. A. Hunter

Of considerable interest is the announcement that **Mr. C. M. Cock,** M.I.Mech.E., M.I.E.E., is relinquishing his post of chief electrical engineer to the Railway Executive, to become manager of the Traction Department of the English Electric Co., Ltd., as from October 1. He has also been elected a member of the Board of the English Electric Export and Trading Co., Ltd. Mr. Cock has had a distinguished and active career in the railway and engineering world both in this country and abroad, and is a recognised authority on railway electrification matters. Born in Melbourne, he gained early training and experience at the Technical School, and with the Victorian Railways. After war service he joined Merz and McLellan in Melbourne in 1919 in connection with the electrification of Melbourne Suburban Railways, and a large power project for the Victorian Electricity Commission. He later transferred to India as a supervising engineer on railway electrification work, and in 1929 joined the G.I.P. Railway Transportation (Operating) Department, holding various positions. In 1945 he came to England to take up the post of chief electrical engineer to the Southern Railway, and on nationalisation of the railways in 1948 was appointed to his present position. Undoubtedly Mr. Cock will play a leading part in the English Electric Co.'s increased activity in the export field covering both electric and diesel-electric locomotives and traction installations.

Mr. C. M. Cock

Mr. F. Hartley has resigned from his directorship of Ega Electric Ltd.

The London and Home Counties Area Final of the E.I.B.A. Golf Championship was played at the R.A.C. Country Club, Woodcote Park, Epsom, recently, and, despite the extremely unfavourable weather, from a total of 70 players who had qualified for the Area Final, 37 actually competed. Prizes were presented by **Mr. P. V. Hunter,** deputy chairman of British Insulated Callender's Cables, Ltd., to the winner, **Mr. A. G. Richards,** of the South Eastern Electricity Board, Croydon, with a score of 75 gross, less 10=65, to the runner-up, **Mr. A. F. Trinder,** O.B.E., of Gurney's Radio and Electrical Engineers, Southall, with a score of 83 gross, less 13=70, and to the scratch prize winner, **Mr. T. T. Reedy,** an electrical contractor of Watford, whose score was 77 gross, less 1=76.

The English Electric Co., Ltd., announce that in view of their increasing business in overseas territories, **Mr. L. H. Short,** M.C., M.I.E.E., M.Inst.T., is appointed deputy general export manager of the company as from October 1. Mr. Short has for some time been fulfilling two functions within the company, that of being responsible for certain specific export fields of the English Electric Co.'s overseas activities, together with that of chief of administration of the firm's Traction Department. In order to enable him to give his whole time to the company's continually expanding export markets, he how relinquishes the administration of the Traction Department, which will be taken over by **Mr. C. M. Cock,** as we note opposite. Mr. Short has held a number of important appointments in the company at home and overseas since he joined the business after the first World War as a pupil, and is a director of the English Electric Export and Trading Co., Ltd.

Mr. L. H. Short

Mr. C. B. Day, who went to Cullompton in 1937 as branch manager to the Culm Valley Electricity Supply Co., and afterwards held the same post under the South Western Electricity Board, was recently presented with a silver entrée dish by Mr. H. T. Corrigan, Tiverton district manager, on behalf of his colleagues, to mark his retirement.

Mr. B. Eastell, Grad.I.E.E., S.I.Mech.E., until recently assistant electrical engineer to the British Engine, Boiler and Electrical Insurance Co., Glasgow, has been elected to the Board of Easco Electrical, Ltd., as director of Marine and Electrical Equipment Division, covering both home and export.

Mr. W. D. Akested has been elected to the board of Ransomes, Sims and Jeffries, Ltd.

The British Electricity Authority has appointed **Mr. E. L. Gethin,** B.Sc., A.M.I.E.E., as deputy chief contracts officer. Prior to vesting day he was purchasing agent (Engineering Division) for Edmundson's Electricity Corporation, Ltd., which he joined in 1930, serving originally as a junior engineer at the head office, and then as assistant mains engineer to the Wessex Electricity Co. Later he became changeover engineer at Cambridge, and in 1935 joined the head office purchasing department. His appointment as purchasing agent (Engineering Division) was confirmed in 1945. This past year he has been at the chief engineer's department at the B.E.A. headquarters as co-ordinating engineer (specifications and contracts), having previously been purchasing officer to the Southern Electricity Board.

Mr. E. L. Gethin

Until recently special consultant on power development at United Nations headquarters, Lake Success, **Mr. J. H. Angus,** M.I.E.E., has been appointed chairman of the Nigerian Electricity Corporation. This Corporation is being set up under an Ordinance passed by the Nigerian Legislative Council in April of this year to take over the electricity undertakings hitherto run by a Government department and to establish new undertakings where necessary. It does not involve the undertakings of Nigerian Electricity Supply Corpn. Ltd. Mr. Angus, who was educated at Wallasey Grammar School and Liverpool Technical College, practised as an electrical and consulting engineer in Great Britain until 1945, when he became, first, deputy director-general Fuel and Power and Public Utilities branch, and later, director of the Public Utilities branch of the Control Commission in Germany. He then worked as director of the Power Division for the United Nations Economic Commission for Europe before going to the United Nations H.Q.

Delegates at the Commercial Instrument Conference at Brighton

Each year at about this time, representatives of firms in the Commercial Instrument Section of B.E.A.M.A. hold a conference, the proceedings of which are mainly of an informal character. This year's get-together took place at Brighton where our accompanying photograph was taken. Those along back, left to right, are Messrs. **H. L. Shaughnessy** (General Electric Co., Ltd.), **A. R. Ridding** (Ferranti Ltd.) **F E**

Pomeroy (Nalder Bros. and Thompson Ltd.), **J. D. Carter** (Ferranti Ltd.), **A. R. Miller** (Nalder Bros. and Thompson Ltd.), **D. Douet** (Johnson and Phillips Ltd.), **W. Bamford** (Everett, Edgcumbe and Co., Ltd.), **N. Devonald** (The British Thomson-Houston Co., Ltd.), **W. C. C. Turner** (Crompton Parkinson Ltd.), **W. A. Shaw** (Evershed and Vignoles Ltd.), **H. S. Laverack** (secretary) and **E. Speller** (Edison Swan Electric Co., Ltd.). In the middle row (left to right) are: Messrs. **A. E. Bates** (English Electric Co., Ltd.), **F. C. Hoyle** (Record Electrical Co., Ltd.), **R. A. Erskine** (Erskine Heap and Co., Ltd.), **L. R. Richards** (Crompton Parkinson, Ltd.), **A. E. Jepson** (hon. member), **E. P. Martin** (assistant secretary), **T. Howard** (English Electric Co., Ltd.), and **W. Ashworth** (Record Electrical Co., Ltd.). In the front are : Messrs. **R. H. Knott** (Metropolitan-Vickers Electrical Co., Ltd.), **D. M. Buist** (B.E.A.M.A. Export Director), **A. G. O'Neill** (chairman) (Nalder Bros. and Thompson Ltd.), **D. D. Walker** (vice-chairman) (Evershed and Vignoles Ltd.), **A. R. Pike** (Record Electrical Co., Ltd.), **H. V. Owen** (hon. member), and **A. G. Lang** (Elliott Bros. (London) Ltd.).

Due to a typographical error, in our account of the I.E.E. golf competition last week, the name of the winner of the singles competition was given as Mr. W. G. Maddock. This should have read **Mr. W. G. Murdoch** (who also won the P.G. Cup).

The Minister of Fuel and Power has appointed the **Rt. Hon. A. Creech Jones** to be a part-time member of the Southern Electricity Board.

OBITUARY

It is with regret that we record the recent death of **Mr. A. D. Church,** M.I.E.E., A.M.I.I.A., assistant manager of the Jamaica Public Service Co. Ltd. in Kingston. It was only early in 1949 that he went out to the West Indies, having been formerly engineer of the Fens sub-area, Eastern Electricity Board.

The death occurred on August 19 of **Mr. F. C. Williams,** aged 63, manager of the Cardiff branch office of G. and J. Weir Ltd.

We learn of the death, on August 19, of **Mr. A. P. Davies,** aged 59, who had been manager of the export department of Lancashire Dynamo and Crypto, Ltd., since 1920. He joined the company as an apprentice in August, 1909. Mr. Davies represented L.D.C. at meetings of the Dynamo and Motor Agreement Export Section, and served on the B.E.A.M.A. Export Panel for several years.

We note the death, on August 25, of **Mr. J. Bilsland,** M.I.E.E., aged 65, who practised as a consulting and contracting engineer for many years.

The death occurred, on August 25, of **Mr. J. Brown,** A.M.I.E.E., who, at one time, was superintendent at Govan power station.

WILLS.—**Mr. F. C. Outram,** A.M.I.E.E., M.Inst.F., late generation engineer (operation) London Division, B.E.A., left £5,675 gross (£5,619 net value).

Mr. J. G. Statter, M.Inst.C.E., M.I.E.E., late chairman and joint managing director of J. G. Statter and Co. Ltd., left £41,975 gross (£41,732 net value).

Submarine Cable Centenary

OPENING the exhibition at the Science Museum marking the Centenary of the submarine cable the Rt. Hon. Ness Edwards, M.P., Postmaster General, expressed his pleasure at the opportunity afforded to the Post Office to take part in the proceedings. He gave a brief review of the part played by the Post Office in establishing cable communications and referred to the development of the submerged repeater used with co-axial cables for telephony.

Sir George Lee who deputised for Prof. Moullin gave some personal experiences of the early days of cable laying, and Lord Plender thanked the organisations taking part in the exhibition for their co-operation.

As part of the opening ceremony a telegram was sent round the world on the cable network and took 53.6 seconds to complete its journey.

Of special interest in the Exhibition is the comprehensive collection of cable sections, ranging from the unarmoured single core, 1850, design of J. and J. W. Brett to the most recent air/teleothene insulated coaxial type. Other notable exhibits include working cable terminals and keyboard apparatus and a wide range of cable-ship models and cable laying and recovery gear.

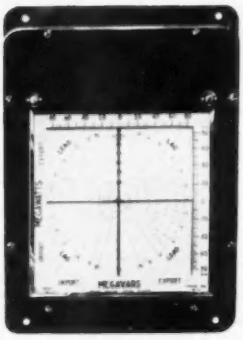
For two hours daily on Sundays, Wednesdays, Thursdays and Saturdays, visitors to the exhibition will be able to exchange messages without charge with the operators in overseas telegraph stations. The exhibition terminal apparatus will be used for this purpose.

In connection with the centenary, Mr. G. R. M. Garratt, M.A., M.I.E.E., has written a short history of cable progress, entitled, "One Hundred Years of Submarine Cables." This illustrated volume takes the story in outline over the full period covered by the exhibition. It is published by His Majesty's Stationery Office, price 2s. 6d.

The BUYER'S *Column*

The "Vectormeter"

A NEW switchboard instrument, the "Vectormeter," introduced by NALDER BROS. AND THOMPSON LTD., of Dalston Lane, E.8, enables simultaneous readings of kW, kVAr, power factor and amps to be observed from one dial.



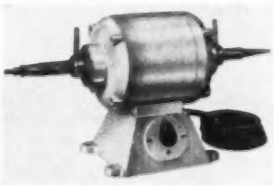
On right: "Duraplug" rubber-moulded plugs and sockets

On left: The Nalder Bros. "Vectormeter"

The instrument comprises wattmeter and reactive kVA meter elements of the centre zero type, with straight-line pointers crossing each other at right angles over a dial marked in concentric circles, representing a current scale, and radial lines indicating power factor, so that current and power factor can be read at the point of intersection of the two pointers. The kW and kVAr scales are at the top and sides respectively and, being of the centre zero type, show whether power is being imported or exported.

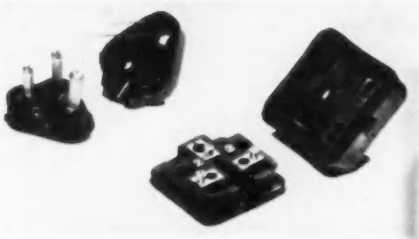
Grinding the Teeth?

A NEW dental lathe has been produced by the CARTER ELECTRICAL CO. LTD., of Romford, Essex. Designed for grinding or light buffing in the surgery or workshop, it is available either as a one- or two-speed unit; 2,800 r.p.m. on load or 1,400 r.p.m. and 2,800 r.p.m. The chucks are left hand for brush, and right hand for wheel, chuck removers being fitted. Two styles are available, the motors varying from $\frac{1}{6}$ to $\frac{1}{3}$ h.p., depending on the style and on the speed factor.



The Carter dental lathe

Normal voltages are 200-220 V or 230-250 V a.c., but other voltages are available. The standard finish is in glossy black or ivory, but other colours can be supplied, if required.



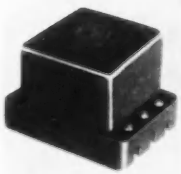
You Won't Crack These!

SAMPLES of "Duraplug" plugs and sockets moulded in rubber are to hand from W. W. HAFFENDEN LTD., of Richborough Rubber Works, Sandwich, Kent, and, by virtue of their construction, appear to be immune from the cracking which so often occurs when plugs are dropped or sockets on skirting boards hit with a broom. The 5-amp plug is of exceedingly simple construction, the plugs being moulded into the "back plate," the remainder of the body consisting of a thick shroud which is a push-on fit over the plugs. The 15-amp is slightly more conventional, having screw fixings and a flat bar type cord grip.

List prices for plugs are 1s. 9d., 2s. 3d. and 2s. 6d. for 2, 5 and 15 amp ratings respectively, while sockets are supplied in 5 and 15 amp ratings at 3s. and 3s. 6d. in brown and black. White can be supplied at an extra cost of 3d. per unit.

Low-Cost Transformers

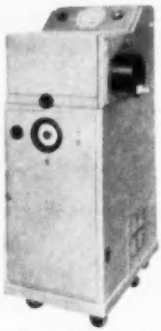
THE "Lilliput" midget bell transformer, manufactured by V. & E. FRIEDLAND LTD., of Lower Heys Mills, Macclesfield, Cheshire, is a lightweight (4¼ oz) transformer of the smallest possible size, its dimensions being 1 9/16 in. by 2 in. by 1 3/8 in. It has an output of 3 VA at 3-5-8 V, sufficient to operate all normal bells. With a strip-wound core, the transformer is listed at 6s. 9d. A larger model, the "Surepunch" for chime operation, gives 10 VA output and is priced at 16s., and includes a one-amp built-in cartridge fuse in the secondary circuit.



The "Lilliput" midget bell transformer

New H.F. Generator

FROM the GENERAL ELECTRIC CO. LTD., Magnet House, Kingsway, W.C.2, comes news of a new 2 kW induction heater which is adaptable to a wide range of applications, including soldering and brazing. Simplicity and low running costs have been the aim in its design, and a single oscillator valve is used with a voltage stabiliser in its filament supply. Output control is by means of a single knob, which adjusts the impedance matching of the load, thus maintaining the correct operating conditions for maximum valve life and efficiency at the same time.



New G.E.C. h.f. generator

The coil block for connecting to the heating coil can be adjusted to extend up to 5 in. from the side of the set, to suit the work or to enable conveyors or handling gear to be accommodated. Supports for a work table are provided. The unit is of robust construction, mounted on rubber-tyred castors, and finished in green and cream. Operating voltage is 360/440 V, 3-phase.

U/V Sterilisation

PARTICULARS have been received from BARBER ELECTRICAL SERVICES, LTD., of Bournville, Birmingham 30, of a new ultra-violet unit for germicidal and deodorisation purposes. The "Buvanizer," as the unit is called, provides radiant energy at 2537 A, in addition to ozone, and is recommended for reducing the risk of bacterial infection in public places and hospitals; for prevention of mould in bakeries; for deodorisation in restaurants, canteens, grocers' shops and food and fruit stores, and for delaying decay of perishable foodstuffs. The unit is of the shielded pattern for wall or ceiling mounting, 50 W rating, and is suitable for rooms of 4,000/5,000 cu ft capacity.

TRADE PUBLICATIONS

ALUMINIUM ALLOY CASTINGS. Information Bulletin No. 17, issued by the Aluminium Development Association, of 33 Grosvenor Street, W.1, deals with casting processes in aluminium alloy. While not intended as a textbook on casting technique, the information contained on characteristics of various processes, sand, gravity die, pressure die, etc., with notes on design and tables of properties of available alloys, will be of the greatest assistance to all users of alloy castings.

SOCKET OUTLETS. Volume 12, No. 2, of *The Crabtree*, published by J. A. Crabtree and Co. Ltd., of Walsall, Birmingham, contains, amongst other items, an interesting article on making full use of the 13-amp ring main socket outlet.

CATHODIC PROTECTION. High Duty Alloys Ltd., of Slough, Bucks, have issued a booklet entitled *Magnesium for Cathodic Protection of a Municipal Piping System*, describing the large-scale use of magnesium anodes as a sacrificial electrode to protect water piping against electrolytic corrosion.

SEARCHLIGHTS AND WINCHES. The London Electric Firm Ltd., of South Croydon, Surrey, have sent us a copy of Catalogue 290, containing description of their principal lines in searchlights, hand winches, and raising and lowering gear for outdoor and large indoor lighting fittings, and contact suspension units.

MOTORS AND GRINDERS. Leaflets are to hand from the Tuscan Engineering Co. Ltd., 447 Grand Buildings, Trafalgar Square, W.C.2, describing their products. These include d.c. motors from ¼ to 3 h.p., squirrel cage motors from ¼ to 15 h.p., single-phase repulsion-induction motors to 6 h.p. and flameproof motors. In addition, the "Tuscan" heavy duty double ended bench grinders with 6-in. or 7-in. wheels are also described.

IMMERSION THERMOSTATS. "Proscon" immersion thermostats for use in water heaters, oil heaters, circulators, etc., are described in a list received from Process Control Gear Ltd., of 56 Victoria Street, St. Albans, Herts. They are available with watertight covers for exposed situations.

STAINED GLASS KILNS. The "Grafton" electrically heated kiln for stained glass firing is described in a brochure received from The Applied Heat Co. Ltd., of Elecfurn Works, Watford By-pass, Herts. Advantages claimed are exact temperature control, uniform temperature distribution and entire absence of risk of contaminating the glass by combustion products.

SAFETY HANDLAMPS. Leaflets from the British Central Electrical Co. Ltd., 6-8 Rosebery Avenue, E.C.1, describes their range of handlamps. In addition to the "Navy" pattern, the various types of "Gripper" lamps are illustrated, including the standard model, the "Super-Gripper," the "Well-Glass," the "Cadet" and the "Baby Gripper" intended for vehicle battery operation.

CONTINUITY TESTER. A further leaflet from the British Central Electrical Co. describes the B.C.E. continuity tester for carrying out full-load continuity tests on flexible conductors and earthing arrangements. Designed for mains operation, this unit provides a test current of 16-18 amps.

FLAMEPROOF MOTORS. Details of the company's range of flameproof induction motors are set out in a new brochure, No. 11021. Brush Electrical Engineering Co. Ltd., Loughborough, Leicester, make these motors in sizes ranging from 10 to 65 b.h.p.

DUST DEPOSITION

Theoretical Estimation of Deposit Rate

WITH the ever increasing quantity of "dirty" coal now being burnt in power stations, the question of dust emission becomes of great importance. In highly industrialised areas, the observed deposit from all sources is about 1,000 tons per sq mile-annum. Under reasonably clean urban conditions this becomes about 100 tons per sq mile-annum, and in clean country places it is as low as 10 tons per sq mile-annum.

In the selection of sites it is therefore of interest to know the form and mechanism of the distribution of dust from chimneys, in order to prevent local complaints from housing estates, etc., or to assess the necessity for introducing various types of dust removal and extraction equipment.

Details of a theoretical method of analysing the dust distribution have been given in a paper published by the Institution of Mechanical Engineers, and written by C. H. Bosanquet, W. F. Carey and E. M. Halton.

In a subject involving so many variables as this, it is, of course, impossible in a comparatively simple treatment to work to a high degree of accuracy. However, the authors consider that the general treatment given is bound to agree with the general behaviour of the dust, and is likely to predict the rate of deposit within a factor of two, which is the observed order of the discrepancies. Greater accuracy could probably be obtained by further work, but for most cases it will be found that a factor of ignorance of two can easily be tolerated because it will not significantly affect the design either of the dedusting equipment which removes the bulk of the dust, or of the chimney stack which dilutes the residue with air.

In order to illustrate the general type of conclusion resulting from the application of the formulae and graphs given in the paper, it is deduced that when the dust and waste heat discharged from a stack are about the same as that discharged from a boiler burning 10 tons of pulverised fuel an hour, it should be possible to avoid all noticeable deposits by using only cyclones and a stack. The cyclones, however, must not discharge particles larger than about 40 microns, and a single stack, which need not be more than 200 ft high, should be used.

General Attack

The following effects must be taken into account when considering the behaviour of the particles emitted.

1. The plume spreads vertically and horizontally, owing to the action of the eddies, in a manner resembling diffusion.
2. The particles are subject to a steady drift downwards due to gravity.
3. During the first few hundred yards of travel the plume rises bodily owing to its initial velocity, and also due to the fact that it is less dense than the surrounding atmosphere. The effective height of emission is thus greater than the stack height and is greater for hot than for cool smoke.
4. As the plume rises it takes with it a quantity of air which has been mixed with it by eddies, and this air, as well as the smoke, is cooled by adiabatic expansion.
5. If the temperature gradient in the atmosphere is less than the adiabatic gradient, the temperature of the plume will eventually fall to that of its surroundings and the rise will cease.

The paper then goes on to give a qualitative analysis of the spread of a cold gaseous or smoke plume and the method of finding the point of maximum deposition of particles with various free falling speeds.

Formulae and Graphs

Part II of the paper is devoted to methods of determining theoretically the plume path and the rate of dust deposition. The first set of formulae calculate the rise caused by the velocity of the stack gases, the density difference between stack gases and atmosphere, and the maximum height of the plume. In most dust problems, the maximum height risen is the only feature of interest. Formulae are also given to deduce the rate of dust deposition, and graphs can be used to evaluate some of the more difficult functions.

The paper concludes by comparing experimental results with the theoretical calculations, and fairly close agreement was found as far as the plume height was concerned. In the deposition work, however, the agreement was not so good, mainly due to the difficulty of obtaining accurate exit gradings and to the sensitivity of the calculated deposit rates to these gradings.

THE WEEK

INDUSTRY *in news* COMMERCE

Fittings Liable to Purchase Tax

CLARIFICATION of the position regarding the purchase tax applicable to certain types of lighting fittings has been made as the result of further consultations by H.M. Customs and Excise with the Electric Light Fittings Association. The Customs have now issued revised information regarding laylights and louvres which should be substituted for that published on page 432 of our March 16, 1950, issue. The new notice is as follows:—

LAYLIGHTS, ETC.—*Not Chargeable:* (*a*) Laylights, designed to be built into, and form part of, the ceiling, whether decorative or plain and whether glazed or louvred, having a superficial area of not less than 21 sq ft for the complete laylight; (*b*) industrial reflector fittings, i.e. fittings without decorative features, and designed, advertised and sold exclusively as industrial fittings, made to recess into the ceiling, whether open or louvred, or glazed with clear glass or clear plastic.

Chargeable.—(*c*) Recessed fittings other than those described in paragraphs (*a*) and (*b*) above; (*d*) suspended laylights and "box" fittings; (*e*) fittings attached to the underside of laylights as boxes, ceiling fittings or pendants, whether the laylight itself is chargeable or not.

LOUVRES.—*Not Chargeable:* (*a*) Plain louvres sold as part of industrial metal trough reflectors.

Chargeable.—(*b*) Louvres sold separately; (*c*) louvres sold as part of any fitting other than reflectors described in paragraph (*a*) above; (*d*) where a louvre or diffusing attachment is sold with a plain basic lighting unit, except in the case of reflectors described in paragraph (*a*) above, tax is chargeable on the fitting as a whole irrespective of whether or not the lighting unit is chargeable when sold separately.

The following additional information should be noted:

LIGHTING FITTINGS ACCESSORIES.—Where these are sold separately they are not chargeable with tax unless such accessories constitute a chargeable fitting in themselves, e.g. galleries which are (*a*) complete with hooks or loops, or (*b*) combined with a ceiling plate, or (*c*) designed for fixing direct to the ceiling. Accessories sold together in association to comprise a complete or substantially complete fitting of a kind used for domestic or office lighting are chargeable with tax.

E.P.E.A. Members' Dinner

THE Minister of Fuel and Power has accepted an invitation to be the principal guest at the annual dinner of the South Eastern Division, given to members of the National Executive Council of the Electrical Power Engineers' Association. This event, the 23rd of the series, will be held at the Connaught Rooms, W.C.2, on November 10, at 5.30 p.m. for 6 p.m.—later in the year than usual due to the incidence of meetings of the National Executive Council. Arrangements will be similar to those in former years, dancing following the dinner. Tickets are £1 1s. each to members and £1 10s. to non-members, further information being available from Mr. F. H. Smethurst, hon. sec., South Eastern Division, 118 New Kent Road, London, S.E.1.

Scientific Film Congress

THE Fourth Congress of the International Scientific Film Association is being held in Florence from October 14 to 22, 1950. As in the case of the three previous congresses held in Paris, London and Brussels, there will be a Festival of Scientific Films during the period of the Congress. A special committee of the British Scientific Film Association has been formed to recommend films for submission to this Festival. This committee would be glad to have information as soon as possible about recent films. Full details about films for submission should be sent, including running time, gauge, date of production, brief synopsis, etc. Those films which may be considered suitable must be viewed as quickly as possible, and producers are asked to indicate whether they will be willing to provide copies for this purpose. Apart from the Festival of Films, there will be specialist group meetings of the Medical, Research Film and Industrial Film Committees, and also the business meetings of the General Assembly of the Congress.

Fire at Colindale Works

A FIRE on Saturday morning last seriously affected a portion of the works of the Everett Edgcumbe and Co. Ltd., but plans have already been put in hand for production, and the employees and plant are being re-deployed so as to continue with production. Fortunately, the machine shop was undamaged and is in full operation. In addition, a certain amount of work is being transferred to the factory at Houghton-le-Spring, Co. Durham, and a new site with buildings adjacent to the works which has recently been acquired is being equipped on an urgent basis. It is expected that certain delays will occur, but production is to continue in certain departments and to be commenced again quite soon in others.

The First Half-Century

It has been pointed out by a dignified member of the electrical profession that the title "electrical engineer" is no longer a becoming one. He says that he takes no pleasure in putting the words to his name on an income-tax form (who does?), owing to the fact that the title has been adopted by many who have no right to it. It was bad enough when every little man who sold pots and pans took this handle to his name; but of late years his employees have followed the fashion and the title is almost a byword.

—*From our issue of August* 30, 1900.

The seaside towns' illuminations season is almost in full swing, attracting tremendous crowds. The latest in the great switch-on is Morecambe, where George Formby performed the inauguration ceremony last Saturday. Here, one of the displays which delighted the children depicted Father Christmas and his reindeer in Happyland. The illuminations at Blackpool are to be switched on by Wilfred Pickles on September 15

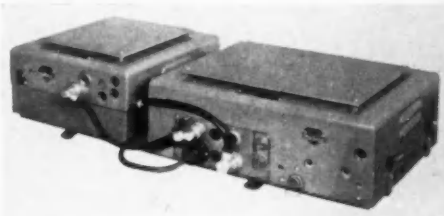
Cross-Channel Television

THE successful demonstration of cross-Channel television last Sunday night marks a milestone in the history of the transmission of information, and a full European coverage using micro-wave links is now well within the bounds of possibility. Standard Telephones and Cables Ltd. were responsible for the portable microwave T.V. links which transmitted the programme from Calais to Dover and thence in a series of hops to the roof of the London University building, where it was transmitted by landline to Alexandra Palace and re-transmitted to the London and Midland viewers. The links work on a carrier frequency of about 4,000 mc/s, and successive links have a frequency shift of about 40 mc/s to avoid mutual interference.

The ancillary communication equipment was made by Mullard Electronic Products Ltd., and comprised six standard 20-watt v.h.f. fixed station radio telephone stations which were used to link the points of re-transmission of vision signals with each other and with the end points.

Viewers were impressed with the remarkable steadiness and clarity of the picture, and it was thought by many that the transmission resulted in better reproduction than is often found on the standard programme service.

Right, the "Standard" microwave receiver at London University Building. Below, the Mullard transmitter/receiver and power unit



S.T.C. Equipment for Greece

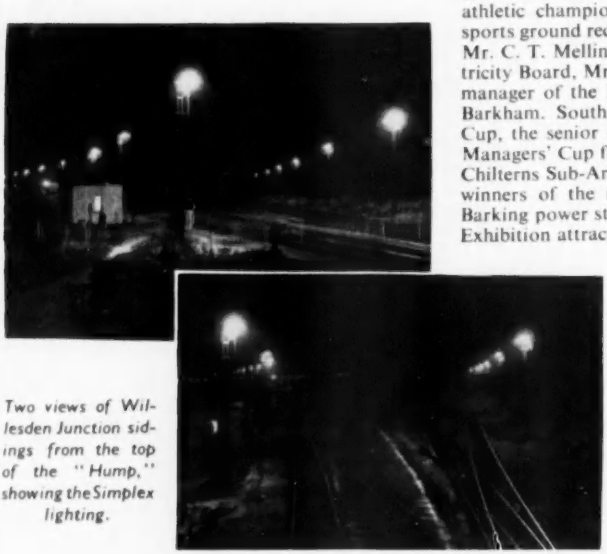
AS part of the complete reconstruction of the Greek telecommunication system, the Greek P. T. & T. authorities have ordered from Standard Telephones and Cables Ltd., their main overseas radio-telephone link system. This will provide telephone circuits to the most modern standards, with the U.K. and the U.S.A. The equipment to be supplied covers the complete system and includes two 4 kW single-sideband transmitters for simultaneous working to London and New York, with a 40 kW power amplifier for use when transmission conditions are poor, two single-sideband receivers, equipment for connecting four speech circuits to the telephone network, including a privacy system and aerials, power plant, etc. The value of the installations is about £80,000.

Increasing British Trade Abroad

A £500,000 contract from Pakistan has been secured by Aberdare Cables Ltd. The contract covers the supply and installation of all electrical equipment for a large manufacturing undertaking in Pakistan. Power will be supplied from existing sources, but the contract includes

several miles of overhead line to the site, supply being given over a wide area including workshops and a new housing estate. The overhead main supply at 11 kV will be brought into main substations and taken by underground cables to a number of substations in which e.h.t. switchgear, transformers and l.t. switchgear will be installed. Aberdare Cables Ltd. are supplying the cables, and South Wales Switchgear Ltd. all the switchgear and transformers. Installation on site will be carried out by Aberfren Cable and Construction Co. Ltd., an associated company. As urgent delivery was an essential basis of the contract, equipment for the first section will be despatched very soon.

C. A. Parsons and Co. Ltd., have received further orders for turbo-alternators valued at $1,000,000 from Canadian firms. Sir Claude Gibb has said that the orders were for an almost exact repeat of machines made for the Canadians some time ago.



Two views of Willesden Junction sidings from the top of the "Hump," showing the Simplex lighting.

Lighting of Marshalling Yards

IN addition to the new lighting of the Willesden locomotive sheds, referred to last week, the marshalling yard at the Willesden Junction sidings has now been equipped with a new scheme of floodlighting. The importance of adequate illumination at marshalling yards is widely recognised, and various schemes have been employed, but there are, as yet, many yards where the lighting equipment is insufficient. Covering about 100 miles of track, the Willesden sidings deal with traffic from North of London, London Docks and London East, and are as busy at night as by day. Here Simplex "Reflecto Flood" lighting equipment has been installed.

The "nerve centre" of the 24-sidings yard is the "Hump" area, where trucks are switched to the required sidings as they pass over the "Hump." The new lighting enables the point-man to see a chalked number on the front of each wagon so that he may switch it to the right siding immediately. 500-W lamps are fitted in the "Reflecto Flood" along the single track of the "Hump," and 300-W lamps elsewhere. The 300-W lamps are mounted two per column, the latter being made by the railway executive from old track. The vitreous enamelled steel floodlights give wide forward and downward illumination. The cast iron weatherproof body with its detachable top provides easy wiring facilities with complete weatherproofing of the lampholder, and connections. For this installation, the Simplex Electric Co. Ltd. supplied a substantial number of "Reflecto-Floods."

Sports in Essex

THE Essex Sub-Area Sports and Social Club (ESTRIC) held its second annual inter-district athletic championship meeting at the Rainham sports ground recently, among those present being Mr. C. T. Melling, chairman of the Eastern Electricity Board, Mr. A. Bond, the secretary, and the manager of the Essex Sub-Area, Mr. R. H. M. Barkham. Southend District won the "Barkham" Cup, the senior officers' trophy and the District Managers' Cup for the second year in succession. Chilterns Sub-Area won the invitation relay race, winners of the invitation tug-of-war being the Barking power station team. An Arts and Crafts Exhibition attracted nearly 300 entries.

To Brighton, to Brighton . . .

MEMBERS of the staff of the British Central Electrical Co. Ltd. recently visited Brighton for their outing and had a most enjoyable day despite unfavourable weather. All participated in the local amusements, while a large number went for a swim, which was followed by high tea. A very happy day concluded after numerous stops on the way home for "light refreshments."

More Service Centres

AT little cost and with no structural alterations, new service centres have been opened by the North-Western Electricity Board at Windermere, Westmorland, and Grange-over-Sands (in No. 6 sub-area), and at Haslingden, Lancs (No. 5 sub-area). In each of these communities—small towns which serve considerable rural areas—the need for an electricity service centre has been felt for a long time, and the Board has taken the first opportunity of increasing its consumer service in each place. The Board now has 87 service centres in operation, and it is intended shortly to open others at Cleveleys, on the Fylde coast, and at Uppermill, near Oldham.

Lewcos Long Service

JUST recently, Mr. W. J. Terry, chairman and managing director of London Electric Wire and Smiths Ltd., and its associated companies, has had a busy time presenting long-service awards to

Mr. W. J. Terry (right) during the ceremony

employees. He was recently performing this duty again at the Leyton works of L.E.W., where he presented badges and National Savings Certificates to 157 members of the staff and works in recognition of their long service with the company.

First Aid Competition

THE British Electricity Ambulance Centre in London will be the scene of the finals in the British Electricity National First Aid Competition to be held in October. The Area Boards and Divisions are shortly to conduct eliminating competitions for the teams, each of which will consist of five men, including one reserve. The team which wins the British Electricity National First Aid Competition will subsequently be eligible to compete in a further competition to be held in November, 1950 against the teams winning corresponding National First Aid Competitions which are being organised by the Police, British Railways and London Transport, British Transport Commission, General Post Office, Ministry of Supply, etc., for the St. John Ambulance Association Grand Prior's trophy.

The latest window display at Crown House, Aldwych, has Mazda lamps and fittings for every lighting purpose as its theme

Refractories at Work

ORGANISED to provide a detailed and up-to-date survey of refractories and the refractories industry for those who use and apply its products, a course of lectures on "Refractories, their Manufacture, Properties and Uses" begins at the Northampton Polytechnic, St. John Street, London E.C.1, on October 3, and continues on succeeding Tuesday evenings up to December 5. The lecturer, Mr. L. R. Barrett, B.A., B.SC., M.S., A.R.I.C., M.INST.F., will in this period range from a general survey of the subject and of the history of the industry, through the raw materials used and the manufacturing processes to user problems and the effect of working environment on refractories. Further details of the course are obtainable from Dr. J. E. Garside at the above address.

Electrical Sheets Dearer

UNDER an Order made by the Minister of Supply, the maximum prices of a limited range of iron and steel products are amended. The principal alterations are increases in the maximum prices of electrical sheets, wire and wire products. The Order—the Iron and Steel Prices (No. 3) Order, 1950—came into force on August 29.

NEWS IN BRIEF

Bridlington is the 106th branch of E.A.W. Formed recently, the branch has as its president the Mayoress of Bridlington.

The final programme of the third International Mechanical Engineering Congress in Brussels this September is now available. It gives details of the factory tours, lectures and social events in finalised form.

Having decided to establish an industrial museum, Birmingham City Council is now seeking suitable exhibits. The museum, to be in Newhall Street, will be divided into scientific and industrial sections, showing the development of industrial methods from early times.

The qualifying and final examinations in "Sales Management," organised by the Incorporated Sales Managers' Association, will be held on December 7-9 next. Entry forms available from I.S.M.A. at 23 Bedford Square, W.C.1, must be returned by October 30.

The Report of the U.K. Industrial Mission to Pakistan was published on Tuesday by H.M. Stationery Office, price 7s.

Electric Supply News

Belfast

In his report for the year to March 30 last, Mr. W. J. Girvan, city electrical engineer and general manager, states that he cannot recommend any further tariff concessions. (Reductions in charges to certain classes of lighting and power consumers were made during the past year.) Units sold in the area of supply amounted to 315,470,962, an increase of 10·68% on 1948-49. Of this total lighting accounted for 16,793,893 units, domestic 88,183,531, general power 130,140,529, shipyards 41,838,680, and transport 38,514,329. Domestic consumption increased by 12·15% during the year. Additional consumers connected numbered 7,023, a further 23 miles of h.t., 95 miles of l.t., and 32 miles of service cables being laid underground. In addition there were 12 more miles of o.h. lines erected. Harbour power station generated 319,025,760 units, consuming 201,404 tons of coal, but the East Bridge station was not operated during the period. The year's operations resulted in a gross profit of £315,481, and after allowing for capital charges and sundry expenditure, the net surplus was £117,159. Negotiations are proceeding between the Corporation and the Harbour Commissioners and plant manufacturers regarding the proposed Ministry of Commerce scheme for the installation on the West Twin Island of a generating station having an initial capacity of 60,000 kW.

Dundee

A protest against the proposal of the North of Scotland Hydro-Electric Board that Dundee should pay a capital contribution towards the cost of the supply of electricity services to a new housing area at Mains of Fintry has been unsuccessful. Rejecting the request, the Department of Health for Scotland stated that, in accordance with past practice, Area Boards were making such charges in cases where revenue from installations would not be sufficient to meet their capital costs. The decision was a matter for the Boards themselves, and the Secretary of State could not ask them to make a reduction which would, in effect, be a concealed subsidy towards the cost of building and equipping houses.

Friern Barnet

The council's policy of supplying and maintaining gas and electric cookers for their tenants is to be changed. The council has decided that in future all housing estate tenants will be required to provide their own cookers.

Meaford

The question of airborne dust and grit from Meaford power station, about which there has been some protest, was raised at an enquiry last Thursday. Residents are concerned lest the proposed extension to the station should increase the trouble. The present station was completed in 1948, and since then many complaints have been made by residents in the village of Barlaston about dust and grit deposits and pollution.

N. Wales

Caravan sites and holiday camps could not be connected up under the present policy of the Merseyside and North Wales Electricity Board, a district committee of the consultative council was told last Thursday. The question arose when the committee were told of an application by a Wolverhampton man for supplies to a bus and caravan at Borth. For the Board it was said that in view of the present heavy calls on labour and materials to meet urgent demands of permanent dwellings, supplies to semi-permanent or seasonal sites could not be considered.

St. Helens

The initial stage in the reinforcement of supply to St. Helens by the Merseyside and North Wales Electricity Board, was completed recently when the first 60 MVA transformer, the new 33 kV switchgear and the two interbus 33/6·6 kV transformers were energised and put on load.

LIGHTING SCHEMES

Newcastle-on-Tyne.—The T.C. is recommended to extend fluorescent lighting in Northumberland Street down Pilgrim Street to the Tyne Bridge, at a cost of about £2,000. It is proposed to instal sodium lamps from Jesmond Road to the city boundary, at a cost of £1,400.

Shrewsbury T.C.—The Electricity and Lighting Committee has obtained authority to borrow £3,410 for various street lighting improvements.

Sittingbourne and Milton.—The U.D.C. has received preliminary approval from the M.o.T. for the re-lighting of the trunk road. Concrete standards, with the horizontal-type lanterns, are to be purchased. There is also a scheme for the re-lighting of Station Street, Crescent Street, Bell Road and High Street, Milton. Surplus new equipment and old but serviceable standards will probably be used for improving the street lighting in New Road and Charlotte Street.

Southport.—The Lighting Committee has approved a scheme for electric lighting in Preston New Road, Sussex Road, Union Street and Hill Street at a cost of £7,000. Tenders to be invited for 200 Class "A" lamps.

Staines.—The U.D.C. has approved a recommendation for improved lighting in Kingston Road at a cost of £7,428.

Thornton Cleveleys.—The U.D.C. is to apply to the M.o.T. for permission to borrow £3,700 for electric lighting in various streets.

Whetstone.—The existing gas lighting is to be replaced by 22 new higher standards with electric lamps. Other lamps will be fitted to the overhead lines and distribution poles.

Wrexham.—The T.C. has drawn up plans for a proposed scheme for sodium and fluorescent lighting for the trunk road and through the town, at an estimated cost of £9,075.

Company Activities

Electrical Components Ltd.

For the year to March 31, combined net profit was £145,290, plus rents, etc., £1,664 (*£236*), making £146,954 (*£127,821 for nine months trading of Electrical Components and twelve months for subsidiaries*). Depreciation on fixed assets takes £12,318 (*£7,983*), amortisation property £505 (*nil*), directors' fees £600 (*£450*), executive emoluments £8,398 (*£7,331*), audit fee £580 (*£428*), bank interest £1,863 (*nil*), interest on loans £3,096 (*£2,779*), leaving a net balance of £119,594 (*£108,850*), plus tax over-provided in a subsidiary £764 (*nil*). To profits tax £18,150 (*£14,900*), income tax £47,377 (*£43,937*), special contribution to E. C. Pension Trust £5,300 (*£4,278*), benevolent fund of Flinders (Wholesale) £200 (*same*), general reserve £20,000 (*same*), contingencies and bad debt reserve £2,500 (*£2,000*), dividends: interim 7½% £7,047 (*£5,481*), final 12½% £11,744 (*£8,612*), leaving £45,242 (*£37,202*) carried forward.

Lancashire Dynamo and Crypto

It is announced that 95% of the shares recently offered as "rights" were applied for and allocated. The issue was for 83,476 £1 Ordinary shares at 80s.

Newton Brothers (Derby) Ltd.

Trading profit for the year to March 31 last was £115,007 (*£84,421*), plus investment income, etc. £2,493 (*£1,891*). To directors' remuneration and pensions contributions £8,698 (*£8,169*), directors' fees £1,625 (*£1,500*), depreciation £9,374 (*£7,247*), taxation £54,054 (*£40,503*), leaving a net profit of £43,749 (*£28,893*). Adding credits from previous years and settlement of outstanding royalties matter nil (*£16,685*), and with £14,809 (*£15,092*) brought in there is £58,538 (*£60,670*). To stock contingency reserve £5,000 (*nil*), general reserve £4,117 (*£35,000*), making £10,000 with £4,875 surplus on sale of investment; reserve for replacement of fixed assets and equipment £11,000 (*nil*), staff pension fund £5,000 (*nil*), and work people's retirement and benevolent fund £4,000 (*nil*). There is an Ordinary dividend of 10% and bonus 5% on capital doubled by bonus issue (*against 17½% and bonus 7½% on 1949 capital*), taking £13,034 (*£10,861*), leaving £16,407 carried forward.

Richardson and Westgarth

Consolidated trading profit to March 31, on completion of contracts, is £643,421 (*£600,225*), less provision for deferred repairs nil (*£75,000*), plus sundry interest £2,699 (*£1,963*), making £646,120 (*£527,188*). To depreciation £82,108 (*£75,704*), taxation £283,150 (*£281,050*), profits retained by subsidiaries £1,424 (*£1,131*), leaving net profit of parent company £279,438 (*£169,303*). Dividend of 12% (*10%*), takes £70,067 (*£58,389*), to general reserve £125,000 (*£80,000*), superannuation reserve £50,000 (*nil*), leaving £126,200 (*£91,829*) carried forward.

Ruston and Hornsby

Consolidated trading profit for the year to March 31, after charging depreciation £220,609 (*£168,801*) and all expenses of working and management, was £1,746,125 (*£1,938,989*), plus investment income, making £1,857,633 (*£2,044,638*). To debenture interest £15,750 (*same*), other interest £3,659 (*£8,128*) capital issue expenses £15,814 (*nil*), profits tax £233,742 (*£241,720*), income tax £697,401 (*£802,397*), tax equalisation reserve £47,250 (*nil*), leaving a net profit of £844,017 (*£976,643*).

Sturtevant Engineering Co.

The directors recommend a share bonus issue of one 5s. share for each five 5s. shares held, by capitalising £49,314 from general reserve. The bonus shares will rank for the dividend payable for the year 1950.

Ultra Electric

Consolidated profit and loss account for Ultra Electric (Holdings) and Ultra Electric for the year to March 31 show a trading profit of £90,003 (*loss £54,649*), less bank interest £7,884 (*£12,643*), depreciation of fixed assets £6,189 (*£7,295*), dilapidations nil (*£500*), pensions £1,693 (*£1,056*), expenses £454 (*£562*), audit fee £525 (*same*), fees of six directors £1,050 (*same*), emoluments of five full-time executive directors £11,566 (*£11,409*). Net trading profit is £60,642 (*loss £89,689*). Deduct special losses totalling £148,537 (*special losses 1948-49 £146,841 net*), also £90,000 provided in previous years, leaving £58,537. Less profit on realisation of asset £11,560, taxation and royalties no longer required £4,479, leaving net credit of £18,144 (*debit £236,530*), reducing the net debit balance at profit and loss to £148,292 (*£166,436*).

Vactric Ltd.

Preliminary statement shows a group trading surplus for the year to March 31 last, after all interest payments, of £130,144 (*loss £68,768*). Depreciation takes £33,557 (*£29,837*), provision for stock obsolescence £16,247 (*nil*), taxation £9,106 (*£2,631*), leaving a net profit of £71,234 (*loss £101,448*). The accumulated loss carried forward is £29,177. No Ordinary dividend is recommended.

Dividends Declared

Aberdare Cables. Interim dividend of 10% (*12½%*).

Crompton Parkinson. First Preference stock dividend of 4% and Second Preference of 3%, payable on September 30.

Ransome and Marles Bearing Co. Final dividend of 12½% and bonus 5%, making 25% (*all same*). Net profit was £309,859 (*£300,487*).

Rheostatic Co. Interim dividend of 4% (6%) on enlarged capital.

Commercial Information

CONTRACTS OPEN

HOME

Sept. 1.—Belfast T.C. 33 kV main cables, auxiliary cables, and accessories for stage 1 of the 33 kV distribution system extensions. Merz and McLellan, consulting engineers, Carliol House, Newcastle-upon-Tyne 1. Deposit £5 5s. (See July 27 issue.)

Sept. 1.—Castle-Douglas. Electrical work on 24 houses at Cairnsmore Rd. R. Ian Hewat, Town Clerk, Castle-Douglas.

Sept. 2.—Bradford T.C. Electrical installation in 160 houses and 20 flats on the Buttershaw estate. City Engineer and Surveyor. Deposit £2 2s.

Sept. 2.—Irvine T.C. Lighting equipment and concrete pillars for installation of sodium lighting on trunk road A.78. Burgh Surveyor, "Heathfield," Kilwinning Road, Irvine.

Sept. 2.—Lancaster. Refrigeration equipment at Royal Albert Hospital for Management Committee. Group Engineer at the hospital.

Sept. 4.—Bury T.C. Electrical installation for lighting, power, etc., at Elton county secondary modern school. Borough Engineer, Town Hall, Bury. Deposit £2 2s. (See August 24 issue.)

Sept. 4.—Edinburgh. Electric light and power installation at Dean College. City Architect, City Chambers, Edinburgh 1.

Sept. 4. — Sunbury-on-Thames U.D.C. Wiring and equipping for electric lighting of (*a*) 34 houses at Sutherland Avenue, and (*b*) 28 houses and bungalows at Nursery Road and Nursery Gardens. Architect and surveyor, Council Offices, Sunbury-on-Thames.

Sept. 4.—Wellington (Salop) U.D.C. Electrical installation to Baths Hall. Engineer and Surveyor, 14 Walker St.

Sept. 5.—Kingston T.C. Installation of traffic signals at Clarence St. Borough Surveyor, Guildhall, Kingston-on-Thames.

Sept. 6.—Aberdeen. Heating and electrical work to Pitsligo school annexe for C.C. George Bennett Mitchell and Son, Architects, 1 West Craibstone St., Bon-Accord Square, Aberdeen. Also electrical work in connection with Causewayend primary school J. A. O. Ailan, Ross and Allen, Architects 10 Bon-Accord Square.

Sept. 6.—Downham (Norfolk) R.D.C. Vertical spindle centrifugal pump, capacity 30,000 galls per hr, with motor and certain electrical gear. Silcock and Simpson, 10 Park Row, Leeds 1. Deposit £5.

Sept. 6.—Dublin. New electric lift at St. Bricin's Hospital, J. Tyrrell, Secretary, Office of Public Works, Dublin.

Sept. 6.—Prestwick T.C. Twenty-seven 140 W sodium vapour discharge lamps, with lanterns, reinforced concrete columns, etc. Borough Engineer, Town Hall, Prestwick. Deposit £2 2s.

Sept. 7.—Dundee. Electric lighting, socket outlets and ventilation and power installation at Albert Institute. City Quantity Surveyor, City Square.

Sept. 7.—Worcestershire. Supply of kitchen equipment and household requisites for home for aged people. County Welfare Officer, County Buildings, Worcester.

Sept. 8. — Bournemouth T.C. Vehicle-actuated traffic signals at Cemetery Junction. Borough Engineer, Town Hall, Bournemouth. Deposit £1 1s.

Sept. 8.—Darlaston U.D.C. Installation of electric light and power in 145 pre-war council houses. Engineer and Surveyor to the Council, 49 Church St. Deposit £2 2s.

Sept. 9.—Middlesex C.C. Supply of electric lamps for twelve months from Nov. 1, 1950. Chief Supplies Officer, 25 Victoria Street (South Block), Westminster, S.W.1. (See August 24 issue.)

Sept. 11.—Birmingham. Electric lighting and power installations at Mortuary Chapel and Forensic Science Laboratory at Newton St. Herbert J. Manzoni, City Engineer and Surveyor, Civic Centre, Birmingham 1.

Sept. 11.—Deben R.D.C. Wiring of 29 houses on various sites. Surveyor to the Council, Council Offices, Melton Hill, Woodbridge. Deposit £2.2s.

Sept. 11.—Enfield U.D.C. For (*a*) 128 lanterns for 400 W h.p.m.v. lamps with control gear and fuses; and (*b*) for 128 reinforced concrete columns, 25 ft. high, and fixing of lanterns Frank Lee, Engineer and Surveyor, 7 Little Park Gardens, Enfield. Deposit £1 on each. (See August 24 issue.)

Sept. 12.—Dewsbury T.C. Electrical installation at Chickenley primary school. Borough Architect, Town Hall.

Sept. 12.—Dublin T.C. Three 300 A and two 400 A electric arc welding machines, and one diesel-engined 300 A electric arc welding unit. J. Tyrrell, secretary, Office of Public Works, Dublin.

Sept. 12.—Musselburgh. Electrical work at Wedderburn House, Inveresk. County Architect, 32 Palmerston Place, Edinburgh 12.

Sept. 13.—Brockhall. Supply of electric lamps for 12 months from Oct. 1, for Hospital Management Committee. H. Lindsay, Secretary, Brockhall Hospital, Langho, Blackburn.

Sept. 14.—Belfast. Electrical fittings and equipment and installation of cable for staff-calling systems, for N. Ireland Hospitals Authority at Musgrave Park Hospital. J. R. W. Murland, Consulting Engineer, 13 Wellington Place, Belfast.

Sept. 15.—Heywood T.C. Electric paper-baler and over-band magnetic separator for destructor works plant at Peel Lane. W. R. Parker, Town Clerk, Municipal Buildings.

Sept. 15. — Norwich T.C. Two hydro-pneumatically controlled, electrically driven pumping sets. Engineer and Manager, Water Department, City Hall, Norwich.

Sept. 18.—Salford T.C. Electrical installations at 4 shops, 4 maisonettes and 259 flats at Ladywell, Eccles New Road, Salford. City Engineer, Town Hall, Bexley Square, Salford 3. (See August 24 issue.)

Sept. 20.—Tyne Improvement Commission. Five 10-ton electric grabbing cranes; also 1,400 ft. of twin conveyor-belt lines

capable of handling 2,000 tons/h. J. K. McKendrick, Secretary, Commission Offices, Berwick Street, Newcastle-upon-Tyne. Deposit £5 5s. each.

Sept. 22.—Kidderminster T.C. Installation of electric lighting and heating points in 332 houses on various estates. J. G. Stewart, Borough Engineer and Surveyor, 110 Mill St., Kidderminster. Deposit £2 2s. Advertised in this issue.

Sept. 23.—Holywood, N. Ireland. Electrical re-wiring of Croft House, Holywood. County Planning Officer, Court House, Downpatrick.

Sept. 25.—Littlehampton U.D.C. Electrical installations in 18 houses at Wickbourne. Engineer and Surveyor, Council Offices, Littlehampton. Deposit £1 1s.

Oct. 18.—Metropolitan Water Board. Two sets of electrically driven well and surface pumps for Chingford Mill pumping station, Hall Lane, Chingford. Chief Engineer's Department (Room 235), Offices of the Board, New River Head, Rosebery Avenue, E.C.1. Deposit £1 1s.

No date stated.—Fife T.C. Electric lighting at Springfield School. Also heating and electrical work for Markinch Junior Secondary School. Surveyors: R. Galbraith and Lawson, 21 Crossgate, Cupar, Fife.

No date stated.—Plymouth T.C. Electrical installation in 50 houses. City Engineer, The Guildhall, Plymouth.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

Sept. 20.—Wellington (N.Z.). Eighteen distribution transformers between 150 and 300 kVA, 3-phase units, suitable for connection to 3-phase supply mains at 6,300 V at 50 c/s, for Dunedin City Corporation. B.o.T. (Ref. CRE (IB) 62599/50.*

Sept. 25.—India. Fifty-two diesel-engine-driven 400/230 V, 3-phase, 50 c/s alternators; two 624 kVA, eight 375 kVA, eleven 250 kVA, seventeen 125 kVA, twelve 62·5 kVA and two 500 kVA. B.o.T. (Ref. CRE (IB) 61259/50).*

Sept. 25.—India. Equipment, including switchgear, transformers, structures, control panels, truck gears, etc., for 66 kV substations at (*a*) Jabalpur, Damola and Sagar; (*b*) Raipur and Drug; and (*c*) Mansar and Tumsar, for the Government of Madhya Pradesh. B.o.T. (Ref. CRE (IB) 61357/50).*

Oct. 3.—Tangier. Two diesel-driven 2,500 kW, 6,000 V, 50 c/s, 3-phase alternators, for the State Water and Electricity Services of the International Administration. B.o.T. (Ref. CRE (IB) 60486/50).*

Oct. 3.—Wellington (N.Z.). Director-General (Stores Division), G.P.O., Wellington C.1. Supply and delivery of submarine telephone cable, paper core, star quad 10 lb conductor, double armoured; 200 pairs No. 4 s.w.g., 20,000 ft or 400 pairs No. 4 s.w.g., 10,000 ft. Cable in one continuous length if possible.

Oct. 11.—Tangier. 600 automatic table telephones and 400 automatic wall telephones, system 24 V, d.c., for Telephone Co. of Tangier. B.o.T. (Ref. CRE (IB) 62688/50).*

Oct. 14.—Syria. Two electric motor driven pumps, motors being 3-phase, 50 c/s, 5,000 V and capable of continuous performance; four diesel driven horizontal motor pumps; three generating units; two transformers, 3-phase, 50 kVA, 5,000/220 V. For the Aleppo Water Supply Service. Chairman, Aleppo Water Supply Service Board, Aleppo, Syria.

Oct. 18.—Umtali T.C., S. Rhodesia. Street lighting equipment: 150 radial wave street light lanterns with 18-in. vitreous enamel reflectors, 50 with G.E.S. and 100 with E.S. lampholders, 45 side entry horizontal controlled cut-off enclosed lanterns for 400 W mercury vapour discharge lamps, 60 weatherproof pole mounting control boxes. Contract E9/1950. B.o.T. (Ref. CRE (IB) 61805/50).*

Oct. 18.—Umtali T.C., S. Rhodesia. Six l.t. substation H.R.C. switchboards, 400 V, 3-phase, 50 c/s, comprising a 500-amp link unit, sheet steel metering panel with three 5-in. dial ammeters, and four 3-phase, 300-amp distributor units. Contract E8/1950. B.o.T. (Ref. CRE (IB) 61802/50).*

Oct. 18.—Umtali T.C., S. Rhodesia. Six 150 kVA 3-phase, 50 c/s. oil immersed, naturally cooled, double wound, core type transformers for indoor service. One 50 kVA 3-phase, 50 c/s for outdoor use. Contract E7/1950. B.o.T. (Ref. CRE (IB) 61800/50).*

Nov. 7.—Wellington (N.Z.). One 50 MVA 220/110/11kV transformer bank and spare unit, comprising four auto-transformer units, each 16,667 kVA

Your Queries — Answered

"Edison" miner's lamp, makers of? S.E.—Thos. A. Edison Ltd., Edison Storage Battery Division, Queenliy Industrial Estate, New Edinburgh Rd., Glasgow E.2. (18669)

"Hyliter" fitting, makers of? T.E.—Courtney Pope (Electrical Ltd., Amhurst Park Works, N.15. (18672)

"Rellim" fans, makers of? T.E.—British Rellim Products, 96 Wimpole St., W.1. (18679)

Combined horizontal cooker and hotplate, makers of? T.E.—Moffats Ltd., 1 Newman St., W.1. (18684)

"Crofts Perfect Couplings," makers of? M.B.—Crofts (Engineers) Ltd., 34 Norfolk St., Strand ,W.C.2. (18687)

Heating units in flooring, makers of? G.H.—Electric Panels Ltd., 123 Blackborough Rd.,Reigate,(18692)

Baby's bottle warmer, bakelite beaker type, makers of? W.S.—Geo. Green (Gee-Gee) Ltd., 18 Camden St., Birmingham. (18703)

"Redot" appliances, makers of? L.E.—Lighting Trades and Welsbach Ltd., 77 Farringdon Rd., E.C. (18706)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWERS WANTED

Cengar Distributing Co., transfer and appliance label firm, address of? S. (18712)

"Wynyates Ware" lighting fittings, makers of? R.C.H. (18719)

127/63·5/11kV, oil immersed and water cooled for Roxburgh power station. Contract No. 158, State Hydro-Electric Dept., Wellington. Deposit £100 B.o.T. (Ref. CRE (IB) 61858/50).*

Nov. 16.—Portuguese West Africa. Transmission line from Mabubas hydro-electrical power station to substation at Luanda. Directorate General of Colonial Development, 13 Praca do Principe Real, Lisbon. Provisional deposit of £4,375 with Bank of Angola, Lisbon. B.o.T. (Ref. CRE (IB) 62304/50).*

CONTRACTS PLACED

Buckie (Banffs.) T.C. Electrical work in erection of houses: Walker and Smith.

North of Scotland H.E. Bd. About 250 miles of 22 kV, 11 kV and lower voltage line in the Island of Skye: B. French Ltd.

Queensbury and Shelf (Yorks.) U.D.C. Provision and erection of sodium street lighting equipment including 25-ft concrete standards: G.E.C. Ltd.

Stockton-on-Tees T.C. Laying cable for Quay extensions and providing two plug boxes for electric crane: Edmundsen's Electric Co. Extending charging bay for electric vehicles: Troughton and Young Ltd.

PRICES OF CABLE METALS AND OTHER MATERIALS

(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	186 0 0	£180 0 0
Delivered in 2nd and 3rd month after order	189 10 0	—
Delivered in 4th, 5th and 6th month after order	201 0 0	—
LEAD, good soft pig (foreign)	112 0 0	112 0 0
" " " " "English" quality	113 10 0	—
Delivered in 2nd and 3rd month after order, plus	7 0 0	—
TIN (99-99.75%) ... (Cash)	808-810	—
" (3 months)	795-800	—
ALUMINIUM, commercial purity (del.)	112 0 0	—
ZINC	127 10 0	120 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	43 5 0	—
Mild Steel Tape (0.04 in.)	26 0 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Stokes Appliances Ltd. A petition for the winding-up of the company will be heard on Oct. 9. Persons intending to appear must notify Pothecary and Barratt, 73-76 King William St., E.C.4, by Oct. 7.

Blythe and Marden Ltd. Radio and electrical engineers of 29a Croydon Rd., Caterham, Surrey. Resolution passed for winding-up at meeting on Aug. 9. Archibald William Hunter, 185 High Holborn, W.C.1, appointed liquidator by creditors.

Gradewell Instruments Ltd. Meeting of members at Windsor House, 46 Victoria St., S.W.1, at 11 a.m. on Sept. 22 to receive liquidator's report and pass resolution for disposal of books, accounts and documents.

BANKRUPTCY ACTS

Public Examination

Wigan. Bannister, John, electrical contractor, 2 The Wiend, Wigan. Examination at Court House, Crawford St., Wigan, on Oct. 12 at 10.30 a.m.

Dividends

Kidderminster. Maddison, Geo., electrician, carrying on business at Church St., Kidderminster. First and final dividends of 7¾d. in the £ payable at official receiver's office, Somerset House, 37 Temple St., Birmingham 2, on September 15.

Receiving Order

Plymouth. Nichols, Reginald Daniel, electrical engineer, carrying on business under name of Eagle Electrical Engineering Co. at 9 Friary St., Plymouth. Date of receiving order, Aug. 17, 1950.

Voluntary Liquidation

L. Bunce (Electrical) Ltd. At the recent meeting of creditors a statement of affairs submitted showed liabilities amounting to £7,022. Assets were estimated to produce £7,100 and after allowing £572 for preferential claims, there were net assets of £6,527, or a deficiency as regarded creditors of £494. Trading accounts for the year ended Sept. 30, 1947, showed sales of £57,673, with a gross profit of £12,977 and a net profit of £6,822. In the following year the turnover declined to £47,574 with a net trading profit of £577. For the year ended Sept. 30,1949, the turnover was £31,953, with a net loss of £7,653. For the period Oct. 31, 1949, to Aug. 9 last, the sales totalled £22,566. Mr. D. Tanfield, 196 Wolverhampton St., Dudley, was appointed liquidator, with a committee of inspection.

TRADE NOTES

Metal Prices.—The price of electrolytic copper was reduced by £16 to £186 as from Aug. 24.

Increases in premiums for forward purchases of copper, lead and zinc, with effect from Aug. 26, are announced by the Ministry of Supply. For copper, the additional charges for second and third months after month of order is £13 10s. (against £1 10s.) and for fourth, fifth and sixth months £15 (against £3). Corresponding extra charges for lead are £7 (against £1), and £8 (against £2), and for zinc £13 (against £1) and £14 (against £2). The Ministry states that the prices have been raised to discourage excessive forward buying in the present volatile state of the markets.

Representative.—As from Sept 1, Linolite Ltd. will be represented in the Yorkshire and East Midland area by Somelec Sales Ltd., 5 Park Place, Leeds.

Change of Address.—As from Sept. 1, the London office of Dorman and Smith Ltd. will be at 10 Emerald St., W.C.1. Tel.: Chancery 6431.

Indian Imports.—The import quota for incandescent lamps and parts thereof has been reduced to 50% of half of best year's imports of these goods from 100% announced in June last. Licences for their imports from soft currency areas, other than Switzerland, will now be granted on the basis of the revised quota. It has been decided to exclude industrial exhaust fans and blowers from the scope of the O.G.L. (No. XVI). Consignments of industrial exhaust fans and blowers despatched on or before Aug. 31, will be deemed to have been imported under O.G.L. XVI. Licences will also be granted where letters of credit have been opened under O.G.L. XVI on or before Aug. 10. These will be valid for shipment up to the period for which the Letter of Credit is valid.

Agent.—Wm. Don and Partners, Crown Works, Crown Point Bridge, Leeds 9, have been appointed to represent J. G. Statter and Co. Ltd. for switchgear in Yorks and N. Lincs.

BUSINESS PROSPECTS

HOME

Aberdare U.D.C. Erection of 9 shops and 6 flats at Penywann. Engineer and Surveyor, Vestry Hall.

Accrington T.C. Erection of 24 houses. J. Wallace Buick, Borough Engineer and Surveyor, Town Hall.

Ainwick. Plans have been approved for a school at Spring Gardens at an estimated cost of £40,000.

Atherstone (Warwick) R.D.C. Erection of 24 houses at Baxterley. H. N. Jepson, Midland Bank Chambers, Nuneaton.

Belfast. Construction of substation at Madrid St. for Electricity Dept., East Bridge St., Belfast.

Bradford T.C. Erection of 20 houses at Eccleshill. City Engineer and Surveyor's Office, Town Hall.

Bristol. Erection of primary school (area 16,200 sq ft) at Eastville. J. Nelson Meredith, City Architect, Eagle House, Colston Avenue, Bristol 1.

Bromsgrove (Worcs). Erection of county primary school at The Lickey for C.C. Nicol, Nicol and Thomas, 111 New St., Birmingham 2.

Castle Ward R.D.C. Erection of 26 houses at Stamfordham. G. E. Dimmack, Engineer and Surveyor, 7 North Rd., Ponteland, Newcastle.

Cookstown, Co. Tyrone. Erection of factory premises (15,000 sq ft) at Burn Rd. Cosgrove and Rooney, Civil Engineers, Molesworth Street.

Crediton U.D.C. Erection of 20 houses at Spruce Park. F. W. Beech and Curnow Cooke, Council's Architects, 15 Dix's Field, Exeter.

Cumberland. C.C. intends carrying out the following schemes next year: six clinics, costing £9,500 each, and one at Penrith, £12,000; health centres at Whitehaven and Workington, £25,000 each; and 27 nurses' homes, £54,000. The C.C. is to spend £2,750 on the erection of a water tower at Penrith. The E.C. is to spend £99,000 on the proposed Whitehaven Valley county primary school.

Dover T.C. Erection of 32 houses at Buckland Valley estate. Borough Engineer, Brook House, Dover.

East Suffolk. Rebuilding of secondary modern school at Needham Market. Apply by Sept. 4. Also erection of police section station at Hopton, near Lowestoft. E. J. Symcox, County Architect.

Esher (Surrey) U.D.C. Erection of block of 12 flats, block of 4 bungalows, and 34, 16 and 12 houses at Cranbrook Drive estate. Engineer and Surveyor, Council Offices, Esher.

Haydock (Lancs) U.D.C. Erection of 26 houses and 4 bungalows at Church Rd. R. Main, Surveyor, Council Offices.

Haverfordwest R.D.C. Completion of 12 houses on three sites. Borough Surveyor, 9 Victoria Place.

Hexham R.D.C. Erection of 12 houses at Haydon Bridge and two at Acomb. G. Nicholson, Clerk, Priestpopple House, Hexham.

Hollingbourn (Kent) R.D.C. Erection of 20 houses at Lenham. F. Miskin, Clerk to the Council, Council Offices, Star House, Maidstone.

Leeds. Alterations to scarlet-fever block at Wharfedale Hospital for Hospital Board. Architect to Board, 29-31, Eastgate Leeds 2.

Maltby U.D.C. Erection of 60 houses on Cliff Hills estate. G. H. Davis, Surveyor and Architect.

Manchester. Erection of warehouse at Wythenshawe. City Architect at Town Hall. Also conversion of building to outpatients' dept. at Withington Hospital for Regional Hospital Board. Thomas Duffy, Architect to Board, 3rd Floor, Sunlight House, Quay St., Manchester 3.

Middlesbrough T.C. Erection of 70 houses at Berwick Hills in groups of 30, 22 and 18. Borough Engineer and Surveyor.

Newcastle. Tenders are to be invited for the erection of 312 houses on Montagu estate, at estimated cost of £400,000.

Newcastle-on-Tyne. L. J. Couves and Partners, Carliol House, Newcastle, are architects for alterations in Grainger St. for Isaac Walton and Co. Ltd. S. J. Stephenson and Gillis, Saville Chambers, North St., Newcastle, have prepared plans for alterations in Clayton St. for M. Jackson and Sons, clothiers. A warehouse is to be built at Stepney Bank for Shilling Brothers to plans by M. A. Mackenzie, 1 Eldon Square, Newcastle. C. Solomon, St. Mary's Place, Newcastle, has prepared plans for extending store in Skinnerburn Rd. for the Tyneside Foundry Co. Ltd.

Newhaven U.D.C. Erection of 22 houses at Meeching estate. Engineer and Surveyor, Council Offices, Newhaven.

Newry U.D.C. Erection of 120 houses at Dromolane Rd. McCarthy and Lilburn, Chartered Surveyors, Scottish Provident Buildings, Belfast.

Nottingham. Erection of infants' school at Melbury Rd., Bilborough, for E.C. R. M. Finch, City Engineer and Surveyor, The Guildhall, Nottingham.

Northamptonshire. County E.C. propose to carry out a school building programme for 1951-52 which includes a three-form entry secondary modern school at Moulton, £110,000; a science block at Kettering grammar, £35,000; and two-form entry secondary modern schools at Towcaster, £90,000, and Duston, £110,000.

Nottingham C.C. is to build 2 hostels on the Strelley Estate at estimated cost of £53,775.

Nuneaton T.C. Erection of 21 houses at Marston Estate. G. Ashton, Borough Surveyor, Council House, Nuneaton.

Ossett. T.C. are to invite tenders for erection of 14 houses in Love Lane and 4 houses at Swithen Bank site.

Rotherham R.D.C. Alterations and additions to 31 houses at Granville St. Taylor, Knight and Co., Brooksmoor House, Grove Rd., Moorgate, Rotherham.

Salford. Rebuilding and extension at The Homestead, Stott Lane, Salford 6. City Engineer's Office, Town Hall, Salford 3.

Scunthorpe. County of Lincoln invite tenders for erection of junior school at Lincoln Gardens, Scunthorpe. A. Ronald Clark, County Architect, County Buildings, Lincoln.

Shaftesbury T.C. Erection of 22 bungalows. H. Orman, Town Clerk, Town Clerk's Offices.

Southall T.C. Erection of houses, bungalows and flats.

Borough Engineer and Surveyor, Town Hall.

Staffordshire. C.C. has approved out-offices at Leek East St. county primary school, £7,100, and Norton county primary school, £4,640.

Stafford T.C. Erection of 54 flats in three blocks at Corporation St. T. H. Higson, Borough Engineer and Surveyor, Mount St.

Stockton-on-Tees. Erection of 196 houses on Roseworth site.

Stoke Newington. B.C. recommended to appoint Howes and Jackman, 1 Verulam Buildings, Grays Inn, W.C.1, architects for erection of 31 flats at Green Lanes (£72,552), and 2 flats at Palatine Road (£3,573).

Swadlincote (Derby) U.D.C. Erection of 24 houses at Newall. Engineer and Surveyor, Bank House, Midland Rd.

Washington (Durham) U.D.C. Erection of 80 houses in Blue House Lane. Borough Surveyor.

Workington. T.C. is to build 52 houses on the Westfield estate.

Worthing. T.C. has approved the installation of illuminations on the sea front at an estimated cost of £2,000.

OVERSEAS

Kansas City, U.S.A. C. and D. Tractor Equipment Co., 3241 North 7th Street, Trafficway, Kansas City, are interested in agricultural machinery, materials handling equipment, construction equipment (mechanical shovels, etc.), and could take on distributorship.

U.S.A.—Howard Toncray II, 904 Equitable Building, Denver 2, Colorado, a manufacturers' agent, is interested in receiving offers from U.K. makers able to supply ¼ h.p. to 2 h.p., 110/220 V, 60 c/s, single-phase motors; 2 h.p. to 10 h.p., 220/440 V, 60 c/s, 3-phase motors (r.p.m. 1,200-1,800, according to size of motors).

West Indies, Turks and Caicos Islands. The Trade Commissioner reports a market for inexpensive domestic radio receivers operated from a 6 V accumulator for which spare parts can be obtained easily and without delay. Direct representation with Turks and Caicos firms is required.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Alan E. Dent Ltd., 24 Russell St., Nelson. To carry on business of electrical engineers and contractors, etc. Cap.: £15,000 in £1 shares. Dirs.: A. E. Dent and Mrs. E. Dent.

A. S. H. Construction Co. Ltd., 71 Windsor Rd., Slough. To carry on business of civil, structural, heating, sanitary, electrical, motor and general engineers, etc. Cap.: £5,000 in £1 shares. Dirs.: A. S. Hallam and J. V. W. Miles.

Jack Davis (Relays) Ltd., 30 Percy St., W.1. Cap.: £1,000 in £1 shares. Dirs.: J. Davis, Mrs. D. Davis and G. Davis.

Lever Bros. (Radio and Television) Ltd., 244/48 Abbey House, Victoria St., S.W.1. Cap.: £1,000 in £1 shares. Dirs.: J. Lever and Mrs. B. Lever.

P. Lowery and Sons Ltd., 271 High St., Acton, W.3. To construct, erect, equip and carry on railways, tramways, gas, electricity and waterworks, roads, bridges, etc. Cap.: £1,000 in £1 shares. F. G. Runge signs as director.

Moraheat Co. Ltd., 85 Edmund St., Birmingham 3. To carry on business of electricians, manufacturers of and dealers in immersion heaters, mechanical and general engineers, etc. Cap.: £1,500 in £1 shares. Dirs.: C. V. Moore, R. H. Moore and J. G. Butcher.

Peerless Mica Co. (Aust.) Proprietary Ltd. Abbey Barn Road, Wycombe Marsh, High Wycombe, Bucks. Cap.: £10,000 in £1 shares. Regd. in Victoria, Australia, to acquire the business carried on as The Coggan Mica Co. at Malvern Road, Malvern, Victoria, to manufacture and deal in mica, mica products, etc. Name of person authorised to accept service: P. C. Eason, The Halden, Candlemas Lane, Beaconsfield.

Peter Loades Ltd., 25 Tower St., King's Lynn, Norfolk. To carry on business of wireless, electrical and general engineers, etc. Cap.: £1,000 in £1 shares. Dirs.: H. C. P. Loades and Mrs. O. R. E. Loades.

Trymvision Ltd., 53 Westbury Hill, Westbury-on-Trym, Bristol. To take over business of a radio and television dealer and servicer carried on as "W. G. Smith" at Westbury-on-Trym. Cap.: £2,000 in £1 shares. Permanent dirs.: W. G. Smith and Mrs. S. E. N. Smith.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Autotron. 677,838. Class 9. Electronic instruments and photo-electric register controlling apparatus for use in colour printing. J. F. Crosfield, Ltd., 56, Northway, N.W.11.

Drydenair. 688,014. Class 11. Electric radiators. Thomas Dryden and Sons, Ltd., Grimshaw St. Foundry, Preston.

Elbric. 688,522. Class 9. Electric storage batteries and electric cigar and cigarette lighters. Societe des Accumulateurs Elbric, Rue Saint Pierre 3, Lausanne, Switzerland.

MEETINGS TO NOTE

TUESDAY, SEPT. 5

ASSOC. OF SUPERVISING ELECTRICAL ENGRS. (West London branch).—Mr. D. R. Orchard on "Problems of Refrigeration." Hammersmith Town Hall. 7.30 p.m. (N.W. London branch).—Mr. H. S. Allpress, A.M.I.E.E., on "Rust and its Prevention in Electrical Installation Practice." St. Hilda's Hall, Northolt Rd., South Harrow. 7.45 p.m.

SCIENTIFIC INSTRUMENT MANUFACTURERS' ASSN.—Annual exhibition and symposium (until Sept. 8). Examination Hall, Queen Square, W.C.1.

WEDNESDAY, SEPT. 6

ASSOC. OF SUPERVISING ELECTRICAL ENGRS. (York branch).—Mr. A. Hall on "Vee Belts and Drives." Royal Station Hotel. 8 p.m. (North London branch).—Mr. E. S. Wilson on "Dielectric Heating" (illustrated). Three Jolly Butchers Hotel, Wood Green. 8.15 p.m.

INSTN. OF PRODUCTION ENGRS. (Liverpool section).—Joint meeting with Illuminating Engineering Society. Mr. W. Robinson on "Lighting for Production." Radiant House, Bold St. 7.15 p.m.

RADIO INDUSTRY COUNCIL.—Radio and television exhibition (until Sept. 16). Castle Bromwich, Birmingham.

FRIDAY, SEPT. 8

ASSOC. OF SUPERVISING ELECTRICAL ENGRS. (Nottingham branch).—Mr. F. V. Howitt on "Thermoplastic and Rubber Insulated Cables." Electricity Showrooms, Smithy Row. 7.30 p.m.

ELECTRICAL TRADES' COMMERCIAL TRAVELLERS ASSOCIATION.—General Meeting. Feathers Hotel, Broadway, Westminster, S.W.1. 5.30 p.m.

Architects:
Gotch, Saunders & Surridge
Kettering

The MISSION HOUSE Kettering

In this house on October 2nd, 1792 a meeting of fourteen men founded the Baptist Missionary Society. Dr. William Carey, the prime mover in planning this meeting, was appointed its first missionary to India. As a missionary, translator, scholar, writer and botanist, Dr. Carey was destined to fame far beyond the Christian world.

The Mission House has now been modernised and wired throughout with HENLEY CABLES.

Electrical Contractors:
Thompson & Barlow Ltd., Market Place, Kettering.

HENLEY CABLES

BY APPOINTMENT ELECTRIC CABLE MANUFACTURERS

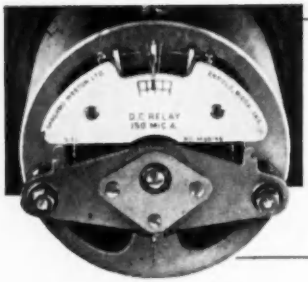
Famous for over a Century

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

FEATURES OF WESTON SUPERIORITY

Weston
MOVING COIL RELAYS

This modern range of relays is ideal for all Laboratory or Industrial Purposes. Built on the permanent-magnet moving coil principle, unaffected by external magnetic fields, the precious metal contacts will not oxidise or tarnish, and the high torque developed ensures positive contact pressure. Supplied in Bakelite casing. Most applications call for special requirements and enquiries should therefore enclose a diagram of the circuit to be closed and state (a) High and/or low contact adjustment; (b) mounting position; (c) resistance; (d) values of current and voltage in local circuit and whether DC or AC; (e) values of resistance and any inductance or capacitance in local circuit; and (f) any special accuracy required. Every 'Weston' relay is specially designed to give the best possible performance for its individual purpose. (The Model illustrated is S54.)



ACCURACY OF ADJUSTMENT. Special note should be made of the reduction gearing which enables the *user* to make accurate adjustment with absolute ease. The accuracy and rigidity of the mounting ensures constant centring after adjustment. Yet another special 'Weston' feature.

SANGAMO WESTON LIMITED

ENFIELD, MIDDLESEX: Telephone: Enfield 3434 (6 lines) & 1242 (4 lines) Telegrams: Sanwest, Enfield.
DEPOTS AT GLASGOW, NEWCASTLE-ON-TYNE, LEEDS, MANCHESTER, WOLVERHAMPTON, BRISTOL, LIVERPOOL, NOTTINGHAM, SOUTHAMPTON, IPSWICH AND BRIGHTON.

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

BOROUGH OF KIDDERMINSTER

DOMESTIC ELECTRICAL INSTALLATIONS

TENDERS are invited for the installation of electric lighting and heating points in 332 existing occupied houses on various council housing estates.

Copies of the form of tender, specification and conditions of contract may be obtained from the undersigned on deposit of a cheque for two guineas (crossed and made payable to Kidderminster Corporation), which will be refunded upon the receipt of a bona-fide tender and the return of all documents. The layout plans of the estates may also be seen at the undermentioned office during normal working hours.

Tenders are to be submitted in a plain sealed envelope, endorsed "Electrical Installations," and delivered to the Town Clerk, Town Hall, Kidderminster, not later than noon on Friday, September 22, 1950.

The Council does not bind itself to accept the lowest or any tender, and reserves the right to allocate the work among two or more contractors as may be deemed necessary.

J. G. STEWART, A.M.I.C.E., M.I.Mun.E., M.I.W.E.,
Borough Engineer and Surveyor.
110 Mill Street, Kidderminster. (F 774)

APPOINTMENTS VACANT

EAST ANGLIAN REGIONAL HOSPITAL BOARD

APPLICATIONS are invited for the following appointments in the Architect's Department of the headquarters staff.

ENGINEERING ASSISTANTS (Salary Grade A.P.T. VI, £595-£660).

Applicants should be members of a recognised professional institution or possess equivalent qualifications and be capable, under direction, of carrying out the design and the preparation of working drawings, specifications, site surveys and reports, estimates of cost, etc., for at least two of the following items, preferably in connection with all types of hospitals.

(1) *(a)* Heating, hot and cold water services
(b) Boiler plant and ancillaries
(c) Kitchen and laundry apparatus
(d) Ventilation and air-conditioning plant
(e) Sterilising apparatus and sanitary services.
(2) *(a)* Electric lighting and power installations
(b) Electro-medical and X-ray apparatus
(c) Telephone, call and signal systems
(d) Lifts.

ASSISTANT QUANTITY SURVEYORS (Salary Grade A.P.T. VI, £595-£660).

Applicants should possess approved qualifications and experience. They should be capable of undertaking all stages in the preparation of a bill of quantities, including detailed approximate estimates, valuation for interim certificates, site measurements and settlement of final accounts.

QUANTITY SURVEYING ASSISTANT (Salary Grade A.P.T. II, £420-£465).

Applicants must be capable of working up from dimensions to bills of quantities and preference will be given to those who have had professional office experience.

Applications, stating age, qualifications, training, experience, present appointment (with salary) and previous appointments (with dates), together with the names of three referees, should reach the undersigned not later than September 22, 1950. Applicants must state clearly the post for which they wish to be considered. K. V. F. Morton, Secretary, 117 Chesterton Road, Cambridge. (F 761)

UGANDA ELECTRICITY BOARD

APPLICATIONS are invited for the undermentioned appointments in connection with the electrical development of Uganda, East Africa. Work has already commenced on the construction of a 150,000 kW hydro-electric power station at Owen Falls on the Victoria Nile, near Jinja, and the two temporary thermal stations, with a total installed capacity of 15,000 kW, are approaching completion.

Uganda has an equable climate. Mean temperatures range between 58° F and 92° F.

POWER STATION SUPERINTENDENT for the Owen Falls hydro-electric power station. This station is being constructed on the River Nile and will have an initial installed capacity of 4 x 15,000 kW sets and an ultimate capacity of ten such sets. Until the Owen Falls station is in operation, the Power Station Superintendent will be required to supervise the operation of the existing oil engine generating stations.

Applicants should be Corporate Members of the Institution of Electrical Engineers or the Institution of Mechanical Engineers, have had a sound engineering training and extensive experience in the operation and maintenance of large power stations—preferably hydro-electric—and have shown themselves to have organising ability and to be capable of handling staff. Salary will be in the scale £960: 960 x 40—£1,320, the point of entry depending upon the candidate's qualifications and experience.

STATION ENGINEER to take charge of one of the Board's diesel engine power stations. Applicants should have had a sound engineering training and experience in diesel engine maintenance and in power station operation. They should also have shown ability to handle staff.

Salary will be in the scale £700: 700 x 40—£940, the point of entry depending upon the candidate's qualifications and experience.

Rent free, partly furnished quarters will be provided or an allowance paid in lieu thereof. Free medical and dental services are provided. First contract will be for three years with 90 days vacation leave (or 180 days if contract is renewed) on full salary at the end thereof. Local leave may also be granted up to a total of 36 days during the period of the contract. The candidates selected would be required to join the Board's Provident Fund Scheme. A free passage will be provided for selected candidates and, if married, for his wife and children under 18 years of age (up to a maximum of one adult fare in respect of children).

Forms of application may be obtained by sending a stamped addressed foolscap envelope to the London Office of the Uganda Electricity Board, 129 Grand Buildings, Trafalgar Square, London W.C.2.

C. R. WESTLAKE,
Chairman.
August 18, 1950. (F 737)

NORTH WESTERN ELECTRICITY BOARD

No. 1 Sub-Area

JUNIOR ENGINEER—TELECOMMUNICATIONS SECTION

APPLICATIONS are invited for the appointment of a Junior Engineer in the Telecommunications Section of the Technical Engineer's Department, No. 1 Sub-Area, Town Hall, Manchester.

The work will be associated with the Sub-Area Supervisory and Telephone Equipment and requires an adequate technical training, together with practical experience of telephone equipment.

The provisional salary for the post will be in accordance with the revised National Joint Board Schedule, Class "M," Grade 20, rising to Grade 17, i.e. £395-£481 per annum.

Applications, stating age, training, qualifications and experience, present position and salary, should be received by the Sub-Area Secretary, The North Western Electricity Board, No. 1 Sub-Area, Town Hall, Manchester, P.O. Box 493, not later than Saturday, September 9, 1950. (F 729)

HIS MAJESTY'S COLONIAL SERVICE

VACANCIES exist for ELECTRICAL ENGINEERS in the Electrical Department, Gold Coast Colony.

The appointment is either on contract or permanent and pensionable. If on contract the salary would be in the scale £884-£1,450 per annum. If permanent and pensionable the salary scale would be £720-£1,300 per annum. In addition to the above a non-pensionable cost-of-living allowance of £114-£165 per annum is payable, depending on the salary. Point of entry in each case depending on age qualifications, experience and war service. For contract appointments a gratuity of £25 for every three months of service is payable at the termination of the service.

Candidates must be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications, or have passed Sections "A" and "B" of the Institution's examination, and should have served an electrical engineering apprenticeship and have a thorough knowledge of generation and distribution. Experience in construction and installation of overhead lines, underground cable network and outdoor and indoor sub-stations, voltage up to 11 kV. The officers selected would be required to take charge of electricity undertakings in the Colony.

Partly furnished quarters at rents of £60-£150 per annum and free first-class passages each way each tour for the officer and his wife, if married, and children up to three in number under the age of nine years, are provided. Home leave on full pay at the end of each tour of 18 months at the rate of seven days for each month of resident service. Income tax at local rates.

Intending candidates should write for further particulars and application form to the Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith Street, London S.W.1, giving brief details of age, qualifications and experience, as soon as possible, quoting the reference number 27326/16. (F 732)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following positions in the Generation Construction Department at Divisional Headquarters in North London:—

(a) GRADE I DRAUGHTSMAN (ELECTRICAL)

The commencing salary will be within the range of £494-£900 per annum plus 5 per cent. London weighting, depending upon experience and qualifications.

(b) GRADE II DRAUGHTSMAN (ELECTRICAL)

The commencing salary will be within the range of £347-£461 per annum, plus 5 per cent. London weighting, depending upon experience and qualifications.

Applicants for position (a) should possess the Higher National Certificate, and for position (b) the Ordinary National Certificate in Electrical Engineering and have a knowledge of the layout of electrical power plant, e.h.t. sub-stations and the preparation of transmission and works power systems.

The salaries are provisional and will be subject to negotiation through the medium of the appropriate negotiating body.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience and present position, should be sent in envelopes, endorsed with the appointment sought, to arrive not later than September 8, 1950, to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14.

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (F 711)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

CAMBRIDGE GENERATING STATION

APPLICATIONS are invited for the following appointment:—

SHIFT CHARGE ENGINEER

Salary in accordance with the revised N.J.B. Schedule, Grade 7, Class "B." (£492-£518 per annum).

Applicants should have served an apprenticeship and obtained an Ordinary National Certificate in electrical and/or mechanical engineering or equivalent, and possess experience in the operation of power stations.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than September 15, 1950. Envelopes should be endorsed "Shift Charge Engineer, Cambridge."

W. N. C. CLINCH,
Controller.

Northmet House, Southgate, N.14. (F 759)

HIS MAJESTY'S COLONIAL SERVICE

VACANCIES exist in the Department of Telecommunications, Federation of Malaya and Singapore, for (a) ASSISTANT CONTROLLERS (ENGINEERING) (Reference No. 27323/8A) and (b) ASSISTANT CONTROLLERS (Radio) (Reference No. 27323/8).

Candidates for (a) must possess Associate Membership of the Institution of Electrical Engineers or Degrees or Diplomas recognised by that Institution as granting exemption from Parts A and B of its examination. In addition they should have not less than two years' practical experience with the General Post Office or with a firm manufacturing telephone and telegraph apparatus. They will be required to take executive control of a district within a telecommunications Region, and will be responsible for maintenance and construction of all manual and automatic telephone exchanges, multi-channel Carrier equipment, teleprinters and V.F. telegraph apparatus, overhead and underground line plant, and general maintenance duties for radio equipment.

Candidates for (b) must possess Associate Membership of the Institution of Electrical Engineers or Degrees or Diplomas recognised by that Institution as granting exemption from Parts A and B of the examination and should have at least two years' experience of the installation and operation of radio equipment. They should have a good knowledge of M.F., H.F. and V.H.F. radio installations, including police V.H.F. mobile communication systems.

Candidates must be British subjects, physically fit and between the ages of 23 and 35 years. Appointments will be on probation for three years for permanent and pensionable employment within the incremental salary scale $520 to $1,065 Malayan dollars per month (equivalent to £728 to £1,491 per annum), including expatriation pay. The point of entry will depend on age, experience and approved war service. In addition a cost-of-living allowance of $150 to $375 per month (equivalent to £210 to £504 per annum) is payable. Government quarters are provided, if available, at a nominal rent. Free first-class passages for the officer, and if married, for his wife and children under ten years of age are provided on appointment and once each way during each tour of service. Home leave on full pay at the end of each tour of three to four years at the rate of four days for each month of residential service.

Intending candidates should write at once to the Director of Recruitment (Colonial Service), Sanctuary Buildings, Great Smith Street, London S.W.1, stating age, professional qualifications, brief details of their experience and the reference number of the appointment for which they are applying. (F 780)

MIDLANDS ELECTRICITY BOARD

Central Gloucestershire Sub-Area

DISTRICT CONSUMERS' ENGINEER—CHELTENHAM

APPLICATIONS are invited for the above post in the Central Gloucestershire Sub-Area.

Applicants should have had sound technical training with practical experience of industrial and domestic load development in rural and urban areas, the organisation of showroom and sales publicity, the operation of tariffs and a knowledge of electrical contracting work. Appropriate technical qualifications will be considered an advantage.

The appointment will be in accordance with N.J.B. conditions and the salary will be in class "D" Grade 4, £667 per annum.

Applications, stating age, experience, present position and salary, should be sent within 14 days to: Mr. D. Holt, Manager, Central Gloucestershire Sub-Area, Midlands Electricity Board, 126 London Road, Gloucester.

A. STEPHENS,
Secretary.

3rd August, 1950. (F 782)

NORTH WESTERN ELECTRICITY BOARD

No. 1 Sub-Area

DEPUTY TO THE CONTROL ENGINEER

APPLICATIONS are invited for the appointment of Deputy to the Control Engineer in the No. 1 Sub-Area Headquarters, Town Hall, Manchester.

Candidates should have extensive experience of the operational control of a large e.h.v. transmission and distribution system, including inter-connected power stations, and supplying a densely loaded industrial area. Experience with a remote supervisory control and switching system, and in a large generating station, will be considered an advantage. Corporate Membership of the Institution of Electrical Engineers is desirable.

The salary, which is provisional, and subject to negotiation with the appropriate body, will be within the range £750-£800 per annum, according to qualifications and experience.

Applications, stating age, qualifications, experience, present post and salary, should be received by the Sub-Area Secretary, The North Western Electricity Board, No. 1 Sub-Area, Town Hall, Manchester, P.O. Box 493, not later than Saturday, September 9, 1950. (F 728)

HIS MAJESTY'S COLONIAL SERVICE

VACANCIES exist in the Government Electricity Undertakings, Nigeria, for ELECTRICAL ENGINEERS.

Candidates must possess Associate Membership of the Institution of Electrical Engineers or an Electrical Engineering Degree or have passed Sections "A" and "B" of the Institution of Electrical Engineers examinations. In addition they must have had a sound training in electrical engineering and wide experience in the construction, maintenance and operation of 6.6/11 kV and low voltage overhead and underground distribution networks with a.c. sub-stations. Sales development and commercial experience is also desirable. Selected officers will be required to take charge of small undertakings in the Colony or to carry out duties under a senior engineer.

Candidates must be British subjects, physically fit and should be between the ages of 26 and 40. Appointments will be on probation for permanent and pensionable employment within the gross incremental salary scale £720-£1,300 per annum, point of entry depending on age, civil experience and length of approved war service. In addition a cost-of-living allowance of £57-£100 per annum is payable, depending on the salary. Partly furnished Government quarters are provided, if available, at a rent of £60-£90 per annum; free first-class passages for the officer and, if married, for his wife once each way each tour; and home leave on full pay after tours of eighteen months at the rate of seven days for each month of resident service.

Intending candidates should write at once to the Director of Recruitment (Colonial Service), Sanctuary Buildings, Great Smith Street, S.W.1, stating age, professional qualifications and brief details of relevant experience. Please quote reference number 27326/19.

(F 736)

BRITISH ELECTRICITY AUTHORITY

London Division

SECTION ENGINEER—TRANSMISSION DEPARTMENT

APPLICATIONS are invited for this appointment from candidates with experience in the maintenance of h.v. switchgear, transformers, overhead lines and cables, and who should preferably be corporate members of the Institution of Electrical Engineers, or hold equivalent qualifications.

The salary and conditions of service will be in accordance with the Revised National Joint Board Schedule, Class "AX.EX," Grade 4, plus London allowance, the salary range being from £718 4/- to £962 17/- per annum.

The appointment will be subject to the provisions of the B.E.A. and Area Boards' Superannuation Scheme.

ASSISTANT SECTION ENGINEER—TRANSMISSION DEPARTMENT

Applications are invited for this appointment from candidates with experience in the maintenance of h.v. switchgear, transformers, overhead lines and cables, and who possess the Higher National Certificate or an equivalent qualification.

The salary and conditions of service will be in accordance with the Revised National Joint Board Schedule, Class "AX.EX," Grade 6, plus London allowance, the salary range being from £541 16/- to £764 8/- per annum.

The appointment will be subject to the provisions of the B.E.A. and Area Boards' Superannuation Scheme.

Applications for both the foregoing vacancies should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, so as to be received not later than September 9, 1950.

J. N. WAITE,
Divisional Controller.
(F 696)

BURGH OF MOTHERWELL AND WISHAW

Burgh Surveyor's Office

PUBLIC LIGHTING DEPARTMENT

APPLICATIONS are invited for the post of ELECTRICAL ENGINEERING ASSISTANT in the Public Lighting Department of the Burgh Surveyor's office. The salary scale is in accordance with Grade A.P.T. IV, i.e. £480 to £525 per annum, by annual increments of £15. The commencing salary shall be fixed having regard to qualifications and experience of the successful applicant. Preference will be given to applicants with public lighting and administrative experience.

The appointment is subject to the provisions of the Town Council's Superannuation Scheme and the person appointed shall submit himself for and shall pass the prescribed medical examination.

Applications, stating age, experience, qualifications, present and previous appointments, and accompanied by copies of two recent testimonials shall be lodged with the Burgh Surveyor Town Hall, Motherwell, not later than September 23, 1950.

A. G. STEWART,
Town Clerk.

Town Clerk's Office, Motherwell.
August 24, 1950. (F 756)

BRITISH ELECTRICITY AUTHORITY

Research Laboratories—Leatherhead

SCIENTIFIC STAFF

APPLICATIONS are invited for appointments on the scientific staff of the Chief Engineer's Department in the Research Laboratories at Leatherhead. Candidates should possess a University Degree with First or Second Class Honours in electrical or mechanical engineering or in physics. Preference will be given to candidates with some research experience.

Duties will include testing, development and research work in the laboratories and in the field in connection with the generation, transmission and distribution of electricity.

The appointments, which are superannuable, will be made within the following salary ranges, according to qualifications and experience.

GENERAL ASSISTANT, N.J.B., Grade 5, £465-£594, rising ultimately to a maximum of £656 per annum.
THIRD ASSISTANT, N.J.B., Grade 4, £644-£769, rising ultimately to a maximum of £849 per annum.
SECOND ASSISTANT, N.J.B., Grade 3, £719-£969, rising ultimately to a maximum of £1,070 per annum.

The successful candidates may be required to pass a medical examination.

Application forms may be obtained from the Secretary's Office (Establishments), Applications Section, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, and should be completed and returned to D. Moffat, Director of Establishments, not later than September 18, 1950. Please quote reference "AE.83." (F 730)

BRITISH ELECTRICITY AUTHORITY

Research Laboratories—Leatherhead

CHEMISTS

APPLICATIONS are invited from chemists for appointments on the scientific staff of the Chief Engineer's Department in the Research Laboratories at Leatherhead. Candidates should possess a University Degree with First or Second Class Honours in chemistry. Preference will be given to candidates with some research experience.

Duties will include testing, development and research work in the laboratories, and in the field in connection with the generation, transmission and distribution of electricity.

The appointments, which are superannuable, will be made within the following provisional salary ranges, according to qualifications and experience.

GENERAL ASSISTANT, N.J.B., Grade 5, £465-£594, rising ultimately to a maximum of £656 per annum.
THIRD ASSISTANT, N.J.B., Grade 4, £644-£769, rising ultimately to a maximum of £849 per annum.
SECOND ASSISTANT, N.J.B., Grade 3, £719-£969, rising ultimately to a maximum of £1,070 per annum.

The successful candidates may be required to pass a medical examination.

Application forms may be obtained from the Secretary's Office (Establishments), Applications Section, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, and should be completed and returned to D. Moffat, Director of Establishments, not later than September 18, 1950. Please quote reference "AE.83." (F 731)

BRITISH ELECTRICITY AUTHORITY

Generation (Construction) Branch Headquarters, London

THIRD ASSISTANT ENGINEERS

APPLICATIONS are invited for appointments as Third Assistant Engineers in the Co-ordination Section of the Generation (Construction) Branch.

The commencing salaries for the appointments, which are superannuable, will be within Grade 4, Schedule "C," of the N.J.B. Agreement, £644 per annum to £769 per annum, rising ultimately to a maximum of £891 per annum, including London allowance.

The successful candidates will be required to assist engineers responsible for co-ordinating generation (construction) work at a group of generating stations. They will be based at headquarters in London, but their duties will entail attendance at site meetings in various parts of the country.

Candidates should hold graduate or associate membership of the I.Mech.E. or I.E.E. or equivalent qualifications and have completed an apprenticeship with a large power station plant manufacturer; experience in the handling of plant contracts and practical erection work on site would be an advantage.

Applications, stating age, present salary, and full details of qualifications and experience, should be addressed to D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, so as to be received not later than September 18, 1950. Please quote reference "A.E. 87." (F 749)

EAST MIDLANDS ELECTRICITY BOARD

Lincolnshire Sub-Area

APPLICATIONS are invited for the post of ASSISTANT ENGINEER in the Boston District. Candidates should have had a sound technical and practical training in the erection and maintenance of overhead lines up to 33 kV, the laying of cables, and erection and maintenance of sub-stations, together with the preparation of schemes, estimating for same, and supervision of construction by direct labour. Candidates should possess the Higher National Certificate or an equivalent qualification.

The salary for this appointment will be in accordance with Class "D," Grade 7 of the National Joint Board Agreement, commencing at £563 per annum, and will be superannuable under the terms of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, and experience, and enclosing copies of recent testimonials, should be addressed to the District Manager, The East Midlands Electricity Board, Boston District, Besco House, Boston, Lincs, so as to arrive not later than September 25, 1950.

P. H. DE KEYSER,
Secretary.
(F 746)

NORTH WESTERN ELECTRICITY BOARD

No. 6 (Lakeland) Sub-Area

APPOINTMENT OF DEMONSTRATORS

APPLICATIONS are invited for the position of Demonstrator in the following districts of the No. 6 (Lakeland) Sub-Area: Barrow, Kendal and Whitehaven.

Applicants should be experienced in public demonstrations of electric cookers and other electrical appliances and hold a recognised certificate in cookery or institutional management.

If the E.A.W. Certificate is not already held, the successful candidate will be expected to take suitable courses to obtain the certificate and eventually the diploma.

The salary for the post will be in accordance with Grade I of the National Joint Council (Administrative and Clerical Grades) for the electricity supply industry. Salary Grades, i.e. £310 by £20 to £390 per annum. (Progress beyond £350 will be subject to a certificate that the person concerned is capable of undertaking all the duties of the grade.)

Applications, stating age, education, training, experience, present position and salary, should be received by the Sub-Area Manager, No. 6 (Lakeland) Sub-Area, The North Western Electricity Board, Castle Green, Kendal, not later than Saturday, September 9, 1950. (F 758)

MIDLANDS ELECTRICITY BOARD

Shropshire and Herefordshire Sub-Area

APPOINTMENT OF DISTRICT ENGINEER

APPLICATIONS are invited for the position of District Engineer in the Shrewsbury district of the above sub-area.

Applicants must have had considerable experience in all branches of distribution work, including the operation and maintenance of high and low voltage cables, overhead lines, substations, protective gear, etc. Candidates with appropriate technical qualifications will be preferred.

The conditions of service will be in accordance with the National Joint Board Agreement and the salary will be £732 per annum, Class "D," Grade 3.

Applications, giving full details of experience and qualifications, should be endorsed "District Engineer" and forwarded within 14 days to Mr. W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

New applications are unnecessary from those who responded to the earlier advertisement for this position.

A. STEPHENS,
Secretary.
(F 760)

CROWN AGENTS FOR THE COLONIES

SENIOR SUPERVISOR (ELECTRICIAN INSTRUCTOR) required by the Uganda Government for special temporary staff, Public Works Department, for one tour of 30 to 36 months, with prospect of permanency. Commencing salary according to age and experience, in scale £550, rising to £815 a year. Outfit allowance, £30. Free passages. Liberal leave on full salary. Candidates, between 25 and 35 years of age, must have served a regular apprenticeship as an electrician and have had experience of electrical installation work for lighting and power, with some knowledge of armature winding and motor vehicle electrical equipment. A City and Guilds Certificate (Electrical Installation), Grade C or equivalent, is desirable.

Apply at once by letter, stating age, full names in block letters, whether married or single, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting M.N 25693/3B on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (F 747)

BRITISH ELECTRICITY AUTHORITY

North Eastern Division

APPOINTMENT OF TWO DRAUGHTSMEN-SURVEYORS, TRANSMISSION DEPARTMENT

APPLICATIONS are invited for the positions of Draughtsmen-Surveyors in the Transmission Engineer's Department at the Headquarters of the North Eastern Division, Newcastle-upon-Tyne 1.

Applicants should be capable of setting out routes, surveying, levelling, and preparing profiles for overhead lines. Experience in the design and layout of sub-stations and also the possession of a car would be considered an added advantage.

The provisional salary for these appointments will be in accordance with Grade 8, Schedule "C," of the National Joint Board Agreement (£437-£604 per annum) and commence at a point commensurate with qualifications and experience.

Superannuation will be in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be made in writing, stating age and giving full particulars of education, qualifications and experience, to Divisional Secretary (Establishments), British Electricity Authority, North Eastern Division, Carliol House, Newcastle-upon-Tyne 1, as early as possible. (F 745)

YORKSHIRE ELECTRICITY BOARD

No. 2 (Huddersfield) Sub-Area

APPLICATIONS are invited for the following appointment:

SERVICE CENTRE SUPERVISOR (Huddersfield District) (Vacancy No. 48/50).

Applicants must have had considerable previous experience in Service Centre work, including the sale of electrical appliances, hire purchase negotiations, etc., and must be capable of advising consumers on any matter relating to the use of electricity.

The successful candidate will be required to take charge of the Service Centre and will be responsible for the keeping of stock records and for the internal staff organisation.

Salary, N.J.C. Agreement, Grade 4, £510/20/£570 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 2 (Huddersfield) Sub-Area, Yorkshire Electricity Board, Market Street, Huddersfield, within fourteen days of the appearance of this advertisement. (F 734)

SOUTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the appointment of:

(a) SENIOR DEMONSTRATOR in the Central Cornwall District, with headquarters at Truro. Commencing salary will be within Grade 2 (£390 by £20 to £450 per annum) of the N.J.C. Salary Agreement.

(b) DEMONSTRATOR in the North Cornwall District, with headquarters at Bodmin. Commencing salary will be within Grade 1 (£310 by £20 to £350 per annum), with further progress to £390, depending upon capability.

Applicants for both positions must have had a good general education and possess a recognised domestic science qualification and the E.A.W. Housecraft Certificate. They must be capable of giving lectures and demonstrations, both in service centres and on consumers' premises, and to advise consumers on the selection and use of electrical apparatus.

In the senior post, the successful candidate will be responsible for demonstrations in the Central Cornwall District and will also act as supervisor of demonstrators within the Sub-Area.

Detailed applications, including age, qualifications, experience, present appointment and salary, should be submitted to Sub-Area Commercial Officer, South Western Electricity Board, Pool, Redruth, within 10 days. (F 748)

THE UNITED CARDIFF HOSPITALS

AN ELECTRICAL ENGINEER is required to provide (or arrange for) maintenance and servicing of all electro-medical installations and equipment. He will be responsible for the periodic inspection and testing of such equipment with a view to ensuring that it complies with safety requirements and for keeping records of such tests. Previous experience and an interest in this type of work desirable.

The successful candidate will be required to become a member of the National Health Service Superannuation Scheme, and the appointment is subject to a medical examination. The salary will be £450 by £15 to £530 per annum.

Applications, stating age, qualifications and experience should be sent to the undersigned not later than September 30, 1950. Arnold Tunstall, Secretary and Principal Administrative Officer, United Cardiff Hospitals, Cardiff Royal Infirmary, Newport Road, Cardiff. (F 757)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited from suitably qualified candidates for the following appointments:—

Essex Sub-Area 78/50

ASSISTANT ENGINEER—Southend District

Applicants, preferably graduate members of the Institution of Electrical Engineers or persons holding equivalent qualifications, should have had a sound engineering training and experience in the construction, operation, and maintenance of h.v. and l.v. underground and overhead systems. Experience of rotary sub-station plant will be an advantage.

The salary for this appointment will be in accordance with Grade 8, Class "F," of the N.J.B. Schedule, commencing at £565 per annum.

Applications in writing, stating age, education, qualifications, training, and details of present employment, should be forwarded to: The District Manager, Southend-on-Sea District, Eastern Electricity Board, 85 London Road, Southend-on-Sea, Essex, so as to arrive not later than 14 days after the appearance of this advertisement.

Fens Sub-Area 83/50

ASSISTANT ENGINEER—Peterborough District

Applicants should have had a sound technical training and experience in the construction, operation, and maintenance of underground and overhead h.v. and l.v. systems.

The salary and conditions of service will be in accordance with the revised N.J.B. Agreement, Class "E," Grade 11, i.e., £450 to £475 per annum.

Applications in writing, stating age, education, qualifications, training, and details of present appointment, should be addressed to: The District Manager, Peterborough District, Eastern Electricity Board, Albert Meadow, Peterborough, so as to reach him not later than 14 days after the appearance of this advertisement.

Northmet Sub-Area 76/50

GENERAL ASSISTANT ENGINEER (CONSTRUCTION)

Applicants, preferably graduate members of the Institution of Electrical Engineers or persons holding equivalent qualifications, should have had a sound engineering training and experience in the work generally associated with a construction department. They must have a thorough knowledge of the theory and practice of fault localising and h.v. testing as applied to cables up to and including 33 kV working, together with initiative and the technical ability to improve methods in this connection.

The salary for this appointment will be in accordance with Grade 13, Class "M," of the N.J.B. Schedule, commencing at £590 per annum, plus London allowance of £30 per annum.

Application forms may be obtained from: The Manager, Eastern Electricity Board, Northmet Sub-Area, Northmet House, Cannon Hill, Southgate, N.14, to whom completed forms should be returned by September 16, 1950.

Northmet Sub-Area 79/50

FIRST ASSISTANT DISTRICT ENGINEER—St. Albans

Applicants should have had a sound technical training and have reached a standard at least equivalent to that of the Higher National Certificate in Electrical Engineering, with experience of 11 kV and l.v. cable systems and the erection, operation, and maintenance of static sub-stations. Preference will be given to corporate members of the Institution of Electrical Engineers.

The salary for this appointment will be in accordance with Grade 5, Class "E," of the N.J.B. Schedule, commencing at £662 per annum.

Application forms may be obtained from: The District Manager, St. Albans District, Eastern Electricity Board, Northmet Sub-Area, St. Peter's Street, St. Albans, to whom completed forms should be returned by September 16, 1950.

Northmet Sub-Area 80/50

ASSISTANT ENGINEER—Welwyn Garden City District

Applicants should have had a sound technical training and have reached a standard of not less than that of the Higher National Certificate in Electrical Engineering, with experience of 11 kV and l.v. cable systems and the erection, operation, and maintenance of static sub-stations.

The salary for this appointment will be in accordance with the N.J.B. Schedule, Grade 8, Class "D," commencing at £524 per annum.

Application forms may be obtained from: The District Manager, Welwyn Garden City District, Eastern Electricity Board, Northmet Sub-Area, 87 St. Albans Road, Hatfield, to whom completed forms should be returned by September 16, 1950.

In all cases future salary and conditions of service will be subject to agreements made from time to time by the appropriate negotiating bodies. The successful candidates will be required to contribute to a superannuation scheme and may have to undergo a medical examination. (F 781)

BRITISH ELECTRICITY AUTHORITY

Production, Inspection and Test Section Generation (Construction) Branch, Derby

(SENIOR ASSISTANT ENGINEER)

APPLICATIONS are invited for the appointment of a Senior Assistant Engineer in Derby as a representative of the Production, Inspection and Test Section of the Generation (Construction) Branch at Headquarters.

The successful candidate may be required for duty in London at some future date when the appropriate removal allowance, etc., would be paid.

The starting salary for the appointment, which is superannuable, will be within Grade 1 of the National Joint Board Agreement, £869 per annum to £1,119 per annum, according to qualifications and experience, rising ultimately to a maximum of £1,235 per annum.

Applicants should have had a good general and technical education and possess a recognised degree in mechanical engineering or equivalent qualifications.

Practical experience in medium or heavy engineering works, preferably in those producing mechanical engineering plant for power stations, such as boilers, pipework and turbines, would be an advantage.

Letters of application, stating age, present salary, and giving full details of qualifications and experience, with particular reference to experience in works progress and inspection organisations, should be addressed to D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, so as to be received not later than September 18, 1950. Please quote reference "A.E. 82." (F 775)

KENT EDUCATION COMMITTEE

DARTFORD TECHNICAL COLLEGE

FULL-TIME LECTURER is required for "heavy current" work in the Electrical Engineering Department. Applicants should have had practical experience in the design, construction and testing of dynamo-electric machines, or experience in the operation and maintenance of power station plant. The Department prepares students for the external B.Sc.(Eng.) Degree of London University, Ordinary and Higher National Certificates, the Graduateship Examination of the Institution of Electrical Engineers and the Intermediate and Final Examinations of the City and Guilds of London Institute in Electrical Engineering Practice.

Salary in accordance with Burnham (Technical) Scale. Forms of application obtainable from Principal, Technical College, Lowfield Street, Dartford. (F 735)

NORTH WESTERN ELECTRICITY BOARD

Area Board Headquarters

THIRD ASSISTANT ENGINEER FOR PLANNING AND DEVELOPMENT

APPLICATIONS are invited for the position of a Third Assistant Engineer in the Planning and Development Section of the Chief Engineer's Department at Area Board Headquarters.

Applicants should have had a sound fundamental training in electrical engineering and general experience in electricity distribution. Preference will be given to applicants possessing a University Degree or Higher National Certificate in Electrical Engineering.

The duties will include the calculation of system fault levels and load flows on complicated networks, and a good knowledge of mathematics is essential.

The salary will be in accordance with the National Joint Board Schedule, and will be within the range of Class "AX," Grade 5, to "DX" Grade 5, i.e. between £579 to £776 per annum, according to qualifications and experience.

Applications, stating age, education, training, qualifications, subsequent experience, present position and salary, should be received by the Establishment Officer, The North-Western Electricity Board, Cheetwood Road, Manchester 8, not later than September 16, 1950. (F 777)

KENT COUNTY COUNCIL

APPLICATIONS are invited for the appointment in the Buildings Department of an ENGINEERING ASSISTANT (ELECTRICAL) in A.P.T., Grade V (£520-£570).

The post is superannuable and the successful candidate will be required to pass a medical examination.

Applicants must be Graduate Members of the Institution of Electrical Engineers with at least five years' experience in the preparation of schemes, specifications and estimates for all classes of electrical installation work.

Applications, on forms obtainable from the County Architect, Springfield, Maidstone, must be delivered to him not later than 14 days after the appearance of this advertisement.

W. L. PLATTS,
Clerk of the County Council.

County Hall, Maidstone.
August 19, 1950. (F 733)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the position of GENERAL ASSISTANT ENGINEER in the Testing Department of the Chief Generation Engineer (Operation). The salary range will be in accordance with Schedule "C" of the National Joint Board Agreement, Grade 8, £437 to £604 per annum, commencing at £437 per annum.

The successful applicant, whose headquarters will be at Hams Hall "B" Generating Station, will be required to assist the instrument engineer in the efficient maintenance of all types of instruments associated with boilers and turbines, other than purely electrical instruments used in connection with electrical energy produced or consumed. In particular, candidates should have had experience in the operation and maintenance of "Multelec" Superheat controllers and conductivity recorders, and Hailey automatic furnace draught controllers. Applicants should also possess the ordinary National Certificate in electrical or mechanical engineering, or equivalent qualifications.

Salary and conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Applications should be made on forms which may be obtained from the Divisional Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned not later than September 16, 1950.

F. W. LAWTON,
Divisional Controller.
(F 779)

A LARGE company in North-west England expanding and re-organising switchgear department have situation for first-class SWITCHGEAR ENGINEER to take charge of switchgear development for air-break and oil-circuit breakers. This is a really good opportunity for a first-class man, will be well paid, and only men with experience will be considered.—Apply, mentioning reference 778, to Box No. 1605, Electrical Times. (F 623)

A LARGE company in North-west England expanding and re-organising switchgear department have several vacancies for good SWITCHGEAR ENGINEERS to take part in the development of air-break and oil-circuit breakers. These positions will give good scope and opportunity to experienced reliable men.—Apply, giving full details, mentioning reference 779, to Box No. 1607, Electrical Times. (F 624)

A LARGE company in North-west England expanding and re-organising switchgear department have situations vacant for first-class DESIGNERS for development of air-break and oil-circuit breakers. Good salary and opportunities for men with initiative, experience, and desire to take responsibilities.—Write, giving full information, mentioning reference 777, to Box No. 1611, Electrical Times. (F 625)

APPLICATIONS are invited by the English Electric Co. from young ENGINEERS of graduate or Higher National Certificate standard, with completed recognised apprenticeship, for tendering and contracts departments at the company's various works handling turbines and other prime movers, electrical plant and apparatus. Selected applicants will, where necessary, be given a short course of preliminary instruction commencing early October, and will receive full pay during training. The positions are permanent and progressive and afford excellent opportunities in the field of commercial engineering. —Applications, quoting Ref. 348A, to Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, Westminster, S.W.1. (F 687)

APPLICATIONS invited from recently qualified young men with good honours degrees in ELECTRICAL ENGINEERING for initial further practical training in this country prior to overseas service with large Middle East Oil Company. Must be single. Pensionable posts, carrying substantial salary and allowances.—Write, with full informative detail and quoting No. 18, to Box 3637, c/o Charles Barker and Sons Ltd., 31 Budge Row, London E.C.4. (F 750)

CHIEF BUYER required for Light Engineering Firm in Home Counties employing approx. 3,000. Age 35-40. Must have held either Assistant or Chief Buyer's position for several years in engineering firm.—Applications, which will be treated in confidence, will only be considered if full details of education and training, positions held and salary required are sent to Box No. 1649, Electrical Times. (F 719)

DRAUGHTSMAN with experience of large transformer manufacture required by electrical engineering company in North-East London. Permanent position, with superannuation scheme, for suitable applicants. Good salary and working conditions. Write, stating age, experience and salary required, to Box No. 1545, Electrical Times. (F 453)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

URGENTLY REQUIRED

POWER STATION CHARGE ENGINEERS

by major oil company for service in the Middle East. Applicants must hold at least Higher National Certificate in Electrical Engineering and have had not less than three years' experience in the operation of large modern Steam Power Stations with thorough knowledge of the routine operation of water-tube boilers, turbo-alternators, E.H.T. switchgear and auxiliary plant. Present position in this country should be not less than Grade 8a, Class "H" or Grade 8, Class "G" on N.J.B. Scale. Age not over 35 years. Married accommodation available. Commencing salary not less than £900 per annum PLUS an allowance in the local currency which is liable to variation but which at the present time is equal to £1,400 per annum. Free passages out and home, free medical attention, kit allowance, good leave arrangements, excellent Pension Scheme. Write giving age, personal particulars and full details of qualifications and experience, quoting Dept. F.189, to

Box No. 2550 at 191 Gresham House, E.C.2

(E 284p)

DRAUGHTSMEN. Ewbank and Partners have several vacancies for Engineering Draughtsmen, who must have experience of power station design and layout. Positions are permanent, with excellent prospects and are pensionable. Free lunches are provided and a five-day week is in operation.—Applicants, preferably aged 25-30, should write, stating age, experience, and salary required, to The Secretary, Ewbank and Partners, Ltd., Engineering Consultants, 15 Grosvenor Place, London S.W.1. (F 612)

DRAUGHTSMEN with experience in the fabrication of large steel tanks and vessels required by electrical engineering company in North-East London. Permanent position, with superannuation scheme, for suitable applicants. Good salary and working conditions.—Write, stating age, experience and salary required, to Box No. 1547, Electrical Times. (F 454)

ELECTRICAL DRAUGHTSMAN required for work on new distribution system with possibility of permanency for suitable man. Experience of large industrial plant electrical layouts, diagrams and specifications is desirable.—Applications, giving age, personal particulars and experience, to be addressed to National Oil Refineries, Limited, Llandarcy, Neath, Glamorgan. Envelope to be marked "Electrical Draughtsman." (F 727)

ELECTRICAL DRAUGHTSMAN required by major oil company for service in the Middle East. Must have served five years electrical engineering apprenticeship, and have had five years D.O. experience in connection with electrical layouts of large industrial plants with underground cable networks. Should possess Higher National Certificate. Graduate or associate membership of a corporate engineering body desirable but not essential. Maximum age limit 35 years. Attractive salary plus generous allowance in local currency. Free passages out and home, free medical attention, kit allowance, good leave arrangements. Pension scheme.—Write, giving personal particulars and details of qualifications and experience, quoting Dept. F.192, to Box No. 2809, at 191 Gresham House, Old Broad Street, E.C.2. Applicants without above requirements will not be considered. (F 322)

EXPERIENCED ELECTRICAL LAYOUT DRAUGHTSMEN required immediately. Knowledge of aircraft electrics preferred but not essential.—Apply, stating age and details, etc., to Staff and Labour Manager, The Bristol Aeroplane Co., Ltd., Aircraft Division, Filton House, Bristol. (F 438)

DRAUGHTSMEN, SENIOR AND JUNIOR for design and development of domestic and heavy duty cooking, heating and kindred appliances. Salary in accordance with qualifications, Birmingham district.

Box No. 1653, Electrical Times. (F 743p)

ELECTRICAL DESIGNER

Applications are invited for the position of Designer of a.c. generators up to approximately 4,000 kVA and 6·6 kV; a full knowledge of the associated equipment would be required.

Applicants should be fully qualified and experienced, and should give in their applications (which will be regarded as confidential) full details including age, salary expected, and if a corporate member of the Institution of Electrical Engineers.

Replies to Box No. 1639, Electrical Times. (F 704p)

ELECTRICAL ENGINEERING DRAUGHTSMAN required, age 28-35. Experience in electrical installation work and factory wiring essential. Mechanical engineering experience an advantage. Salary on A.E.S.D. Scale or according to experience.—Full details of education, training, qualifications and experience to Employment Manager, Turners Asbestos Cement Co., Ltd., Trafford Park, Manchester 17. (F 676)

ELECTRICAL ENGINEER wanted for sales office of manufacturer, outside London, making large resistors for motor control gear, to handle inquiries and application design.—Full particulars to Box No. 1657, Electrical Times. (F 762)

ELECTRICAL ENGINEERS, age 26 to 33 years, with qualifications of Higher National Certificate standard and experience in manufacture, repairs, and maintenance of electrical plant, are required as inspecting engineers in areas London, Birmingham, Gloucester, Carlisle, Inverness, and Stoke. Progressive salary, commencing £450, rising to £650 per annum, and free pension. Contributory Widows and Orphans' Scheme.—Apply in own handwriting, stating age, qualifications, experience, and whether married or single by letter marked "Electrical Inspector" to Chief Engineer and General Manager, The National Boiler and General Insurance Co., Ltd., St. Mary's Parsonage, Manchester 3. (F 674)

EXPERIENCED condenser and feed heater DESIGNER ENGINEER or DESIGNER DRAUGHTSMAN required for turbine design department of large firm in the Midlands.—Please apply, stating experience and salary required, to Box No. 1619, Electrical Times. (F 638)

EXPERIENCED steam turbine TEST ENGINEER for turbine test department of large firm in the Midlands. —Please apply, stating experience and salary required, to Box No. 1617, Electrical Times. (F 637)

EXPERIENCED LINESMEN required for power line construction work in all parts of the British Isles. Rates of pay in accordance with Civil Engineering Construction Conciliation Board's agreement.—Please apply, in writing, to Contract Department, Henley's Telegraph Works, 51-53 Hatton Garden, London E.C.1, giving details of recent experience and employers. (F 772)

FOREMAN LINESMAN, fully experienced in all types of power line construction, required for South Africa. Permanent position for the right man.—Apply in writing to the Contract Department, Henley's Telegraph Works, 51-53 Hatton Garden, London E.C.1, giving full particulars of experience, recent references, and age. (F 688)

ILLUMINATING ENGINEER, experienced in modern lighting practice, required in London I.E. department for the planning, estimating, and supervision of street lighting projects.—Applications, stating experience, qualifications, and age, to Siemens Electric Lamps and Supplies, Ltd., 38-39 Upper Thames Street, E.C.4. (F 785)

LIFT LAYOUT DRAUGHTSMAN wanted. Good wages, plus bonus.—Apply, Marryat and Scott, Ltd., Wellington Works, Hounslow. (F 744)

MONSANTO CHEMICALS LIMITED invite applications from young qualified electrical engineers for the position of ASSISTANT ELECTRICAL ENGINEER at their Ruabon factory. Applicants should be in the age group 25-30 and have knowledge and experience of factory distribution systems at both h.t. and l.t. voltage, installation and maintenance of all types of motors and control gear, lighting requirements and factory wiring systems. Excellent opportunity and experience offered to the right type who wishes to make works engineering his career. Electrical staff at present numbers 60. Staff pension fund in operation. Salary according to age and experience.—Applications, giving age, education, qualifications and experience in chronological order, should be addressed to Chief Personnel Officer, Monsanto Chemicals Limited, 8 Waterloo Place, London S.W.1. (F 754)

LIFT DRAUGHTSMEN, senior and junior, for contracts and for mechanical equipment department. Good prospects for advancement, South Midland area. Forty hour, five-day week. Salary according to age and qualifications.—Box No. 1647, Electrical Times. (F 718)

MACHINERY and general engineering. DEPARTMENTAL MANAGERS wanted. Permanent progressive position. Salary and share of profits. Excellent opportunity for persons with initiative, capable acting own responsibility.—Write, giving full particulars of past experience, to Box No. 7251, Frost-Smith Advg., 64 Finsbury Pavement, London E.C.2. (F 670)

SENIOR ELECTRICAL DRAUGHTSMEN required by established British firm with American affiliation. Experience of power distribution and lighting installations, as applied to the Oil Refinery and Chemical Industry, essential. Qualifications to H.N.C. Standard. Substantial salaries will be paid to suitable applicants.—Write, stating age, qualifications and experience, Foster Wheeler, Ltd., 3 Ixworth Place, London S.W.3. (F 786)

SHIFT CHARGE ENGINEER, H.N.C. standard, with practical experience of charge duties in a central generating station of about 40 m.w.—comprising w./t. boilers, turbo-alternators, h.t. switchgear—for Middle East duty with large oil company. Age limit 35. Salary from £850, plus allowances £330-£640, dependent on marital circumstances; free furnished quarters; married applicants required to serve singly throughout first duty tour; pensionable post; biennial (paid) home leave.—Write, quoting No. 21, to Box No. 3648, c/o Charles Barker and Sons, Ltd., 31 Budge Row, London E.C.4. (F 787)

STRUCTURAL DESIGNER with experience in light steel structures required for work in London Office in connection with radio masts and towers.—Apply, stating age, qualifications, experience and salary required to the Staff Officer, British Insulated Callender's Construction Co., Ltd., 21 Bloomsbury Street, London W.C.1. (F 767)

TECHNICAL SALES ENGINEERS are required as Representatives in Lancashire and North-East areas. Applicants must have had sound technical and practical training, preferably to A.M.I.E.E. standard, and also some commercial experience. Age limit approximately 28-35. Permanent position, good pension scheme, and prospects are offered to men of keen intellect, initiative, and sense of responsibility, able to work with a minimum of direction, but backed by the resources of a large organisation throughout the electrical manufacturing industry.—Write, giving personal particulars, details of qualifications, and experience, and order of salary required, to Box No. 1637, Electrical Times. (F 685)

TEST ENGINEER required, age about 25. General electrical engineering experience N.C. standard, familiar with use of precision instruments, knowledge of radio desirable. Canteen facilities. Salary according to experience.—Write, Nevelin Electric Co., Ltd., Purley Way, Croydon. (F 671)

WIREMEN required by Contracting Department, Midlands Electricity Board. Wide range of jobs. Only tradesmen need apply.—The District Manager, Midlands Electricity Board, Hall Street, Dudley. (F 741)

YOUNG ELECTRICAL ENGINEERS required by specialists in large power station equipment—boiler plant, coal, and ash plants, and ancillary equipment. Work involves preparation of schemes and tenders for motors, starters, switchgear, cabling and control systems. Sound technical training required. Previous experience desirable but not essential. Excellent working conditions and prospects; pension scheme in operation. Full details of age, qualifications and experience to personnel department, Simon-Carves Ltd., Stockport. (F 680)

THE FORD MOTOR COMPANY LIMITED

has an immediate vacancy in their power house (present capacity equivalent to 70,000 kWs) for a

MECHANICAL MAINTENANCE ENGINEER

Applicants should have extensive maintenance experience of modern high-pressure boilers, turbines, and auxiliary power house plant.

Membership of professional institution or equivalent qualifications essential. Commencing salary £750 per annum. Successful candidate will be appointed to the company's permanent staff, with appropriate pension rights.

Applications, giving full particulars, should be made to

Ford Motor Company, Ltd., Salaried Personnel Department, Dagenham, Essex.

(F 657p)

APPOINTMENTS FILLED

REQUIRED for Middle East, all-round ELECTRICIAN (Box No. 1591). The position has now been filled and all applicants are thanked.

APPOINTMENTS WANTED

A SALES EXECUTIVE, known throughout the Midland counties, with practical and technical training and specialised knowledge of all forms of domestic and industrial heating and cooking, water heating, switchgear, and installation products, and for many years manager of a leading manufacturer's branch and sales organisation in that area, would be pleased to hear from anyone interested.—Box No. 1625, Electrical Times. (F 641)

ELECTRICAL ENGINEER, 20 years' experience in electrical engineering and contracting, seeks progressive appointment in commercial or engineering section of the industry at home or overseas.—Box No. 1661, Electrical Times. (F 764)

FOREMAN ELECTRICIAN (37), considerable experience industrial, heavy plant, housing, theatre, large shop, overhead, underground and general works installations, planning, labour control, estimating. Free.—R. Lamberton, Alfriston, Sussex. Phone 306. (F 658)

WORK WANTED

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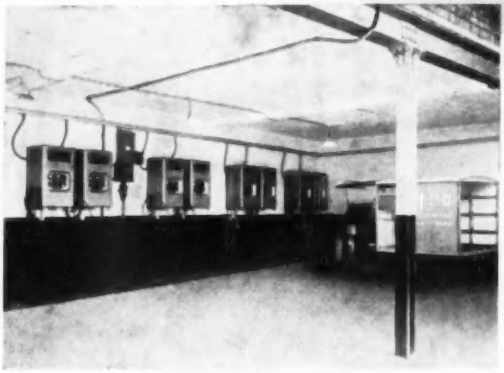

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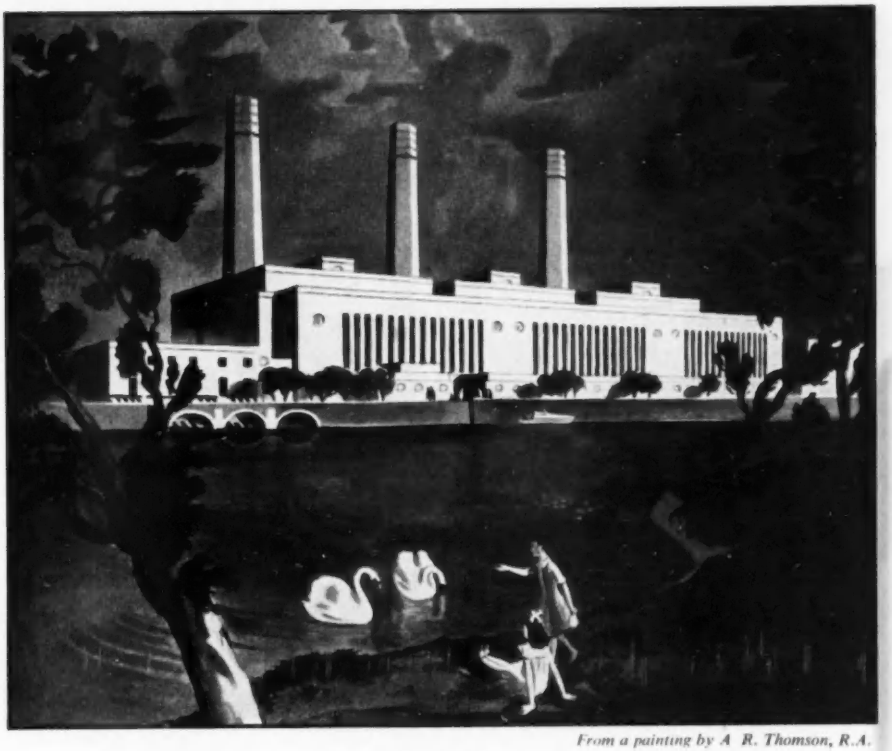

From a painting by A. R. Thomson, R.A.

Another New Power Station

ON THE WEST BANK of the River Trent, near Newark, stands one of Britain's finest power stations. Staythorpe — the fourth great post-war power plant to be brought into operation by British Electricity — is an engineering triumph of which the nation can be proud.

A great achievement

The entire 150-acre site of this power plant was raised 9 feet to bring it above flood level. 1,600 people have laboured, building roads and railways. Thousands of tons of steel and concrete and millions of bricks have been used. The plant and equipment were made in workshops all over Britain. Already one third of the plant is in operation and, when completed, the total output of Staythorpe will be 360,000 kilowatts. An unusual feature of the station is the use of "Spreader" type stokers — the first large-scale installation in this country. The coal is spread by eight rotary feeders.

What it means to you

Staythorpe is only one of 38 power stations being built by British Electricity. In addition, 43 existing stations are being extended to give increased output. It is part of the plan to provide Britain's factories and workshops, farms and homes with the abundant power they urgently need.

more power FROM STAYTHORPE **means more power to the nation**

BRITISH ELECTRICITY

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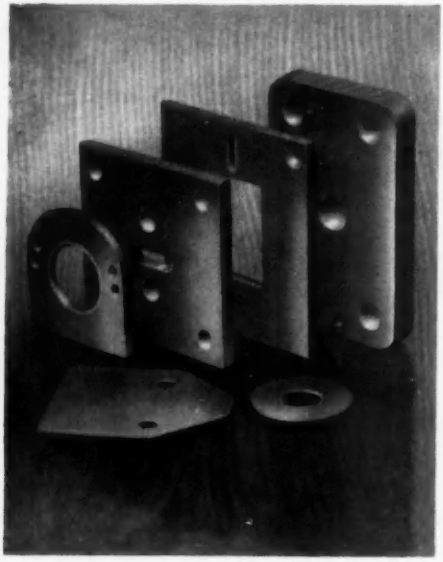

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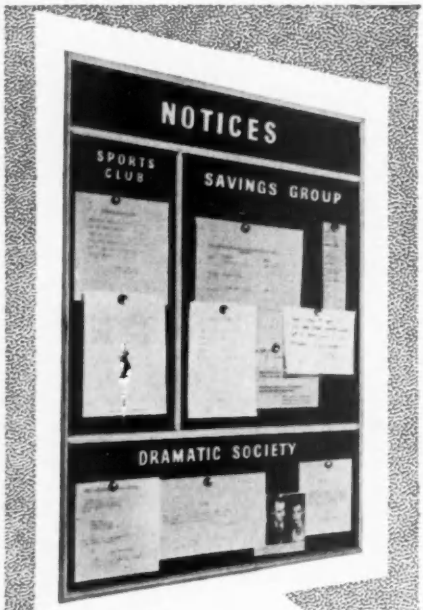

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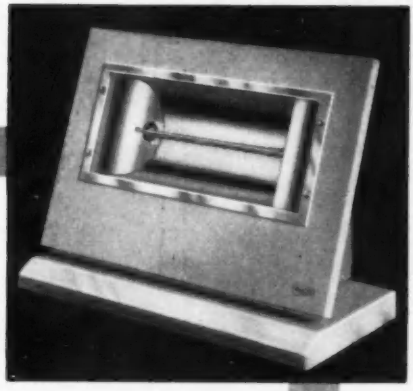

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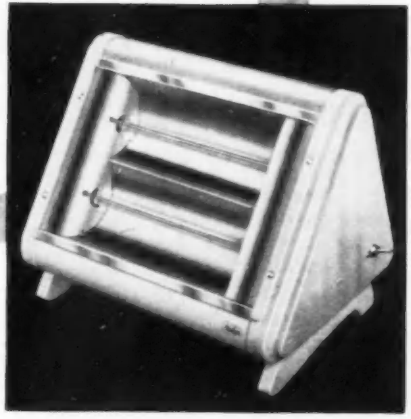

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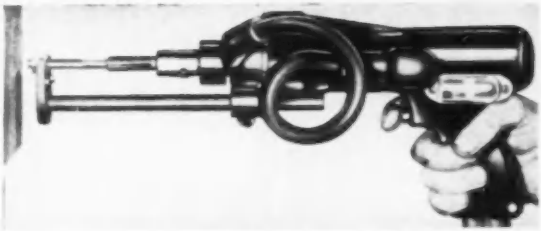
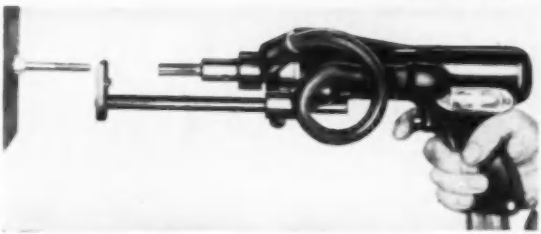


TWO

THREE



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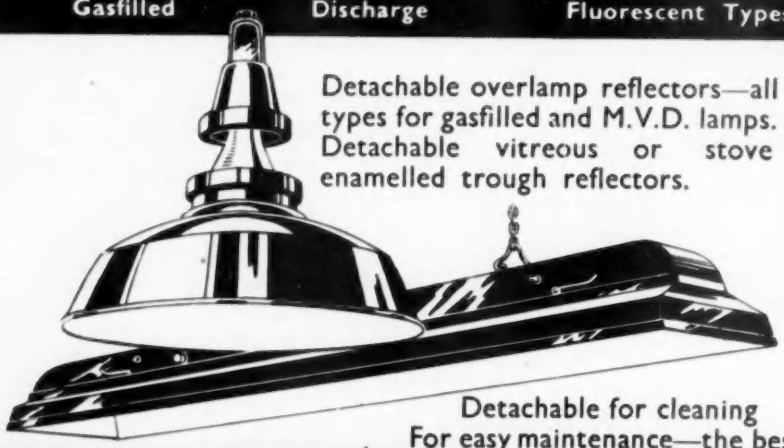

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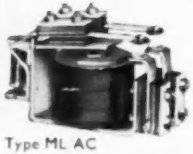

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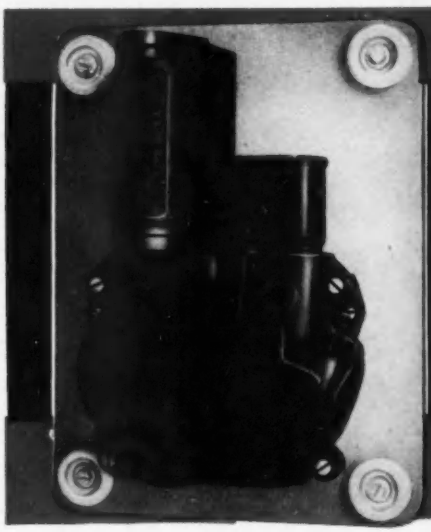

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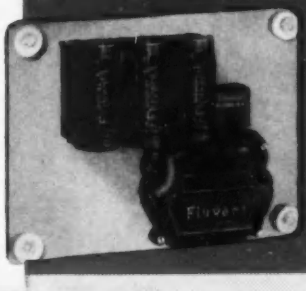

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